THE UNIVERSITY OF ALBERTA

THE PSYCHOLOGICAL CORRELATES OF EXERCISE DEPENDENCE IN AEROBICS INSTRUCTORS

by

CHERYL A. COOK ©

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN

PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

FACULTY OF PHYSICAL EDUCATION AND RECREATION

EDMONTON, ALBERTA

FALL, 1996

National Library
of Canada

Acquisitions and
Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale
du Canada

Direction des acquisitions et
des services bibliographiques

395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your file Votre référence

Our file Notre référence

The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

ISBN 0-612-18149-9

Canada

THE UNIVERSITY OF ALBERTA

LIBRARY RELEASE FORM

NAME OF AUTHOR: CHERYL ANNE COOK

TITLE OF THESIS: THE PSYCHOLOGICAL CORRELATES OF EXERCISE DEPENDENCE IN AEROBICS INSTRUCTORS

DEGREE FOR WHICH THESIS WAS PRESENTED: MASTER OF ARTS

YEAR THIS DEGREE GRANTED: 1996

Permission is hereby granted to THE UNIVERSITY OF ALBERTA LIBRARY to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly, or scientific research purposes only.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

Cheryl A. Cook
87 Alberta Drive
Fort McMurray, Alberta
T9H 1P7

DATED Aug 27 1996

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled THE PSYCHOLOGICAL CORRELATES OF EXERCISE DEPENDENCE IN AEROBICS INSTRUCTORS submitted by CHERYL A. COOK in partial fulfillment of the requirements for the degree of MASTER OF ARTS.

Leonard Wankel
Supervisor, Dr. L. Wankel

Co - Supervisor, Dr. G. Wheeler

Garry Smith
Dr. G. Smith

Dr. G. J. Fishburne
Dr. G. Fishburne

Date Aug 28, 96

DEDICATION

This is dedicated to

my Father Robert B. Cook

my Mother Anna A. Cook

my Brother Curtis M. Cook

my Grandmother Dorothy M. Cook

and of course my dog Sparkey Cook

There is only one thing to say. Thank-you

ABSTRACT

The relationship between certain psychological characteristics and exercise dependence (as measured by the Commitment to Exercise Scale) was determined in a sample of 155 aerobics instructors currently certified in the province of Alberta. Participants were chosen randomly from a list of aerobics instructors and participated in a questionnaire-style survey designed to assess self esteem, body image, compulsivity, perfectionism, and exercise dependence.

Results suggested a positive and significant correlation between exercise dependence and compulsivity, perfectionism, and body dissatisfaction and a negative correlation between exercise dependence and self esteem. Stepwise multiple regression showed that perfectionism, body dissatisfaction, self esteem, and physical activity predicted 19.6% of CES variance. Visual inspection of a subgroup of the top 25 CES scores showed that a greater proportion of those who scored high on exercise dependence (Group A) scored above the mean on compulsivity, body dissatisfaction and perfectionism, and below the mean on self esteem than those who did not score high on exercise dependence (Group B). As well, the two groups evidenced some differences in the strength of different motives behind teaching aerobics classes.

The data were discussed in terms of past research findings. It was concluded that those who score high on exercise dependence are slightly more likely to fit Zaitz's profile of aerobics instructors who become dependent on exercise. It was suggested that there is a need to establish normative data for exercise dependence so scales may be used in diagnosing individuals with problematic levels of exercise dependence.

ACKNOWLEDGEMENTS

The author would like to thank the members of her thesis committee for their time and help in preparing this thesis. I would also like to thank them for their patience in working around my hectic schedule.

I would like to thank Power Productions Canada for their help with sending out more questionnaires than I could handle by myself.

I would also like to thank the University of Alberta Fitness Unit and the Rick Hansen Centre for their help with the logistics of this research.

Thank-you Dan, Alethia, John, and the rest of my fellow graduate students for your support and friendship.

Finally, I would like to thank the staff of the Kinsmen Sports Centre for their assistance and support. They have helped me in so many ways that words could never express my appreciation.

Table of Contents

Chapter Page

1. PLAN OF THE STUDY 1

1.1 INTRODUCTION 2

1.2 STATEMENT OF THE PROBLEM 8

1.3 PURPOSES AND OBJECTIVES OF THE STUDY 9

1.5 RATIONALE OF THE STUDY 11

1.6 LIMITATIONS OF THE STUDY 11

1.7 DELIMITATIONS OF THE STUDY 12

2. REVIEW OF LITERATURE 13

2.1 INTRODUCTION 13

2.2 EXERCISE DEPENDENCE AS AN ADDICTION 13

2.3 EXERCISE DEPENDENCE AS A POSITIVE OR NEGATIVE ADDICTION 19

2.4 PHYSIOLOGICAL FACTORS IN EXERCISE DEPENDENCE 22

2.5 PSYCHOLOGICAL CORRELATES OF EXERCISE DEPENDENCE 26

2.6 SOCIOCULTURAL CONSIDERATIONS IN EXERCISE DEPENDENCE 31

2.7 MEASUREMENT OF EXERCISE DEPENDENCE 34

2.8 EXCESSIVE EXERCISE AND THE EATING DISORDERS 39

2.9 DIRECTION OF CAUSALITY 44

2.10 SUMMARY 48

3. METHODOLOGY 50

3.1 SAMPLE 50
3.2 DESIGN 50
3.3 DATA ANALYSES 51
3.4 MEASURES 51
3.5 PROCEDURE 58
4. RESULTS AND DISCUSSION 59
4.1 DESCRIPTIVE STATISTICS 59
4.1.1 SUBJECTS 59
4.1.2 TEACHING FITNESS CLASSES:MOTIVATIONAL FACTORS 60
4.1.3 PHYSICAL ACTIVITY LEVEL 66
4.1.4 COMMITMENT TO EXERCISE (CES) 68
4.1.5 PSYCHOLOGICAL SCALES 68
4.2 CORRELATIONAL ANALYSIS OF THE DATA 71
4.2.1 EXERCISE DEPENDENCE AND PSYCHOLOGICAL CHARACTERISTICS 71
4.2.2 PSYCHOLOGICAL CHARACTERISTICS AND MOTIVATIONAL FACTORS 73
4.3 PREDICTION OF CES BY STEPWISE MULTIPLE REGRESSION 77
4.4 HIGH CES SCORES:MOTIVATIONAL AND PSYCHOLOGICAL PROFILES 79
4.5 DISCUSSION 85
4.5.1 TEACHING FITNESS CLASSES:MOTIVATIONS 85
4.5.2 DESCRIPTIVE DATA:PSYCHOLOGICAL SCALES 88

4.5.3 CORRELATION AND PREDICTION OF CES USING SELECTED PSYCHOLOGICAL VARIABLES....89
4.5.4 EXERCISE DEPENDENCE IN AEROBICS INSTRUCTORS....94
4.5.5 LIMITATIONS AND CONTRIBUTIONS OF THE RESEARCH....99
5. SUMMARY, FUTURE DIRECTIONS, AND CONCLUSIONS....103
5.1 SUMMARY OF THE STUDY....103
5.2 RECOMMENDATIONS FOR FUTURE RESEARCH....104
5.2.1 MEASUREMENT OF EXERCISE DEPENDENCE....104
5.2.2 DELINEATION OF EXERCISE DEPENDENCE....104
5.2.3 SAMPLE POPULATIONS....105
5.2.4 STUDY DESIGN....105
5.3 CONCLUSIONS....105
BIBLIOGRAPHY....108
APPENDICES....121
APPENDIX A "FITNESS INFORMER" PRE-SURVEY CONTACT....122
APPENDIX B COVER LETTER TO PARTICIPANTS....123
APPENDIX C INFORMED CONSENT FORM....125
APPENDIX D QUESTIONNAIRE....126
APPENDIX E ITEMS COMPOSING OBLIGATORY AND PATHOLOGICAL EXERCISE....139
APPENDIX F DESCRIPTIVE STATISTICS:INDIVIDUAL ITEMS OF CES....140
APPENDIX G CORRELATION MATRIX OF ALL VARIABLES....141
APPENDIX H PSYCHOLOGICAL SCORES, PHYSICAL ACTIVITY SCORES,

AND CORRESPONDING RANK 143

APPENDIX I PEARSON CORRELATION COEFFICIENTS - OBLIGATORY EXERCISE (OE), PATHOLOGICAL EXERCISE (PE), PA, AND SELECTED PSYCHOLOGICAL VARIABLES 144

List of Tables

Table Page

4.1 EDUCATION LEVEL.....61

4.2 EMPLOYMENT STATUS.....61

4.3 AGE IN YEARS.....61

4.4 HEALTH STATUS.....62

4.5 INCOME LEVEL.....62

4.6 MARITAL STATUS.....62

4.7 MEANS, STANDARD DEVIATIONS, MINIMUM, AND MAXIMUM SCORES ON MOTIVATION FOR TEACHING AEROBIC FITNESS CLASSES.....63

4.8 FREQUENCY OF RESPONSES ON MOTIVATION FOR TEACHING AEROBIC FITNESS CLASSES.....65

4.9 PHYSICAL ACTIVITY SCORES AND VARIABLES ACROSS STUDIES.....67

4.10 MEANS, STANDARD DEVIATIONS, MINIMA, MAXIMA, AND RANGES FOR AGE, PHYSICAL ACTIVITY, AND ALL PSYCHOLOGICAL VARIABLES.....69

4.11 PEARSON CORRELATION COEFFICIENTS - CES, PA, AND SELECTED PSYCHOLOGICAL VARIABLES.....72

4.12 PEARSON CORRELATION COEFFICIENTS - MOTIVATIONS TO TEACH AND SELECTED PSYCHOLOGICAL VARIABLES.....74

4.13 PEARSON CORRELATION COEFFICIENTS - SELECTED

PSYCHOLOGICAL VARIABLES........76
4.14 STEPWISE MULTIPLE REGRESSION:MODEL SUMMARY OF PREDICTOR VARIABLES ON CES........78
4.15 DESCRIPTIVE STATISTICS ON FREQUENCY OF RESPONSES ON MOTIVATION FOR TEACHING AEROBIC FITNESS CLASSES FOR SUBJECTS SCORING 1 SD ABOVE THE MEAN OR HIGHER ON CES (GROUP A)........80
4.16 DESCRIPTIVE STATISTICS ON FREQUENCY OF RESPONSES ON MOTIVATION FOR TEACHING AEROBIC FITNESS CLASSES FOR SUBJECTS NOT SCORING AT LEAST 1SD ABOVE THE MEAN ON CES (GROUP B)........81
4.17 DESCRIPTIVE STATISTICS ON COMMITMENT TO EXERCISE FOR SUBJECTS SCORING 1 SD ABOVE THE MEAN OR HIGHER ON CES (GROUP A)........83
4.18 DESCRIPTIVE STATISTICS ON COMMITMENT TO EXERCISE FOR SUBJECTS NOT SCORING AT LEAST 1 SD ABOVE THE MEAN ON CES (GROUP B)........84
4.19 DESCRIPTIVE STATISTICS ON PSYCHOLOGICAL SCALES AND PHYSICAL ACTIVITY FOR SUBJECTS SCORING 1 SD ABOVE THE MEAN OR HIGHER ON CES (GROUP A)........86
4.20 DESCRIPTIVE STATISTICS ON PSYCHOLOGICAL SCALES AND PHYSICAL ACTIVITY FOR SUBJECTS NOT SCORING AT LEAST 1 SD ABOVE THE MEAN ON CES (GROUP A)........86

List of Figures

Figure Page

4.1 HISTOGRAM FOR TOTAL SCORES ON COMMITMENT TO EXERCISE SCALE........70

CHAPTER 1

Plan of the Study

1.1 Introduction

It is generally accepted that regular physical activity such as walking, running, and aerobic dance, results in physiological and psychological benefits (Fentem, 1994). These benefits are far-reaching, and include improved self esteem (Raglin,1990), decreased anxiety (Morgan, 1979b), and lower body fat (Getchell, 1992). It has also been suggested that the advantages of engaging in a personal fitness program may explain how some come to depend on exercise to provide these benefits (Anshel, 1991). This dependence on exercise results from a combination of psychological (Yates, 1991), sociocultural (Rodin, 1990), situational (Peele & Brodsky, 1991), and physiological (Thompson & Blanton, 1987) variables. Exercise dependence is a result of the experiences of contemporary North America (Peele & Brodsky, 1991). Modern society is characterized by self-consciousness and compulsivity, catalysed by images portrayed by the media (Restak, 1987;Yates, Shisslak, Crago, & Allender,1994). The body has become a fashion statement and an indication of how hard the individual works at self improvement (Rodin, 1992). In this way, society encourages the prevalence of concerns like,"Do I look fit enough?" rather than,"Am I fit?" (Rodin, 1992). Although recognition of exercise dependence is a relatively recent phenomenon, it is increasingly prevalent in some sport/exercise circles (Yates et al., 1994). At present, it is seen as one of the most controversial areas in exercise research (Thompson & Blanton, 1987).

Exercise dependence can been defined as:

> an unhealthy reliance or compulsive need for the next workout, not necessarily to improve performance in competition, but to deal with daily stresses and provide relief from bad feelings associated with not working out (Barrett, 1994; Benyo,1990).

More specifically, exercise dependence can be defined by the presence of three characteristics: exercise tolerance, psychological reliance, and withdrawal (Solomon, Oakley & Ksir, 1990; Barrett, 1994). These features have been discussed by several researchers (Morgan, 1979a; Chan, 1986; Veale, 1987;1991). For example, Chan (1986) describes the "typical" exercise addict as one who "is between ages 20 and 60, female or male, and began exercising in adulthood as a way to lose weight and to become more physically fit" (p.430). This initial healthy commitment, however, turns to an obsessive-compulsive behavior when exercise becomes the most important aspect of life (Miller,1993). The physical activity is no longer simply a way of improving health or losing weight, it becomes an end in and of itself (Blumenthal, Rose & Chang, 1985). The person exercises more and more in an attempt to achieve an earlier level of euphoria and/or relief, and will continue to exercise even when it is "medically, vocationally, or socially contraindicated" (Morgan, 1979a, p.59). This means that when overtraining is implied by re-occurring overuse injuries such as stress fractures, torn ligaments, and tendinitis, the exercise dependent individual continues to give an exercise routine higher priority than personal health, jobs, family, or friends (Chan, 1986; Morgan,1979a). The development of withdrawal symptoms when the opportunity to exercise is removed include depression, anxiety, irritability, insomnia, and irregularity (Morgan, 1979a).

Clearly, too much exercise can actually be worse than none at all (Rodin, 1992).

The vast majority of studies on exercise dependence have been done on runners (Hauck & Blumenthal, 1992), and most of these runners have been males (Furst & Germone, 1993). These studies have largely confirmed the existence of the three components of acquired dependence in running. For example, Glasser (1976) looked at the benefits derived from running, as well as the euphoria and the intense commitment that many runners bring into their workout, and coined the term "positive addiction." He claimed that these benefits derive from the "positive addiction state" (Glasser, 1976), or what others call the "runner's high" (Benyo, 1990), or the "opening up" phenomenon (Kostrubala, 1976). Morgan (1979a) reported on the undesirable dimensions of physical exercise, discussing eight case studies on runners which he described as "negatively addicted." These individuals planned their lives around their runs, partly because they could not tolerate the disrupted mood that occurred with a skipped workout (Morgan, 1979a). The effects of running deprivation were looked at specifically by Thaxton (1982), who concluded that any deviations from running schedules have a negative impact on "addicted runners." Runners who were prevented from exercising showed elevated depression scores on the Profile of Mood States (POMS) and significantly higher galvanic skin response (GSR) scores (Thaxton, 1982). More recently, Pierce et al. (1993b) studied a group of runners with varying competitive orientations and found evidence for a tolerance effect. That is, exercise dependence scores linearly increased with increasing competitive distances ran (Pierce et al., 1993b).

The etiology of exercise dependence has not yet been clearly established. As with any addiction, it is a complex, multifaceted phenomenon (Donovan, 1988). Each of these facets must be assessed independently and then integrated and interpreted to get a complete picture of the addiction process (Donovan, 1988). This partly involves isolating the personality factors associated with the development of an exercise dependence so that those most at risk can be identified and monitored (Anshel, 1991; Polivy, 1994). Furthermore, effective education for those "at risk" may prevent the occurrence of exercise dependence.

There is considerable evidence to indicate that an activity, whether running, aerobics, or swimming, is merely a vehicle that the person uses to express a compulsion which is already present (Benyo, 1990; Dishman, 1985; Little, 1969; Polivy, 1994). Chan (1986) notes that running and other forms of aerobic exercise "often develop into obsessions among individuals who demand high standards and achievements for themselves in other spheres of life" (pg.430). Because of this achievement orientation, exercise becomes an additional stressor creating yet another requirement for the day's already demanding agenda (Chan, 1986; Peele & Brodsky, 1991). From this perspective, a dependence on exercise has little to do with physical activity and is more an outward sign of a dysfunctional reaction to the stresses, strains, and expectations of life (Benyo, 1990; DeFries, 1981; Sacks, 1981). This, however, is only one explanation for the observed relationship between compulsiveness and excessive exercise (Kagan & Squires, 1985). The opposing arguement is that involvement in the activity contributes to the development of compulsive exercise in those who pursue fitness (Polivy, 1994), and those that are dependent on exercise represent a pathological extreme of adherence (Davis; 1990; Davis, Fox, Cowles, Hastings, & Schwass, 1990; Lyons & Cromey, 1989). Morgan's (1979a) case studies illustrate that excessive activity promotes addiction. As a result of this research, he advocates moderation in exercising (Morgan, 1979a). At this point, however, the direction of causality remains unclear.

Many of the studies on running have found that those classified as "running addicts" share certain characteristics (Estok & Rudy, 1986; Kagan & Squires, 1985; Rudy & Estok, 1989; Yates, 1991). Kagan and Squires (1985) found that males who exercised the most "tended to most accurately fit an "addictive" profile, to be relatively rigid and compulsive", while "amount of exercise among females was associated with lower levels of compulsiveness but higher levels of Type-A behavior" (p.233). Similar findings have been reported by Yates and colleagues (1983; 1991; 1994), who describe the activity disordered person as strong on achievement orientation, independence, self control, perfectionism, and persistence. Two further studies found that "high-addiction" runners tended to score lower in self-esteem (Estok & Rudy, 1986) and higher in anxiety (Rudy & Estok, 1989) than "low-addiction" runners.

There is some question, however, as to whether findings based on runners can be generalized to athletes in other sports (Yates et al., 1994). Exercise dependence can be found in almost any sport, particularly endurance sports (Chan, 1986). It is important to learn, therefore, about the potential 'addictive' process in other aerobic-based activities, such as aerobic dance, rowing, and swimming (Anshel, 1991; Pierce, 1994). There is also a need to study the occurrence of exercise dependence in women (Furst & Germone, 1993).

There have been some recent studies associating exercise dependence with sports other than running, including swimming (Crossman, Jamieson, & Henderson, 1987), rowing (Zerbe, 1988), and dancing (Pierce, Daleng, & McGowan, 1993a). One study described two rowers involved with their sport to the point of addiction (Zerbe, 1988), while another found that dancers scored significantly higher on the Negative Addiction Scale than runners (Pierce et al., 1993a). Two other studies found addictive characteristics in a group of excessive exercisers, but did not specify the types of activities these groups participated in (Anshel, 1991; Furst & Germone, 1993). For example, Furst and Germone (1993) found no difference in scores on the Negative Addiction Scale between a group of "exercisers" and a group of runners.

One population that has been largely neglected is the aerobic fitness class population. To date, there appears to be only two studies which have looked at exercise dependence in this group. One study found evidence of dependence in aerobic fitness class participants (Napier & Briant, 1990). This study focused on behavioral indicators of exercise dependence, such as exercise history and exercising while injured (Napier & Briant, 1990), while Zaitz (1989) chose to focus on the psychological concomitants of exercise dependence in aerobics instructors. Zaitz (1989) reports on two fitness instructors whose desire to be perfect caused them to exercise compulsively, teaching two or more classes per day. It was their "deep inner feelings of not being good enough, not doing enough (to obtain approval from others) and not being thin enough (thus not attractive enough)" that drove them to teach their third class that day (p.42). It has been suggested that those most susceptible to exercise dependence are individuals who channel all of their energy into a certain sport (Wichmann & Martin, 1992). Quite often fitness instructors follow a single-activity exercise program, for example, they depend entirely on the aerobics classes they teach for their exercise (Zaitz, 1989).

Zaitz (1989) claims that perfectionism, compulsiveness, low self esteem, and poor body image are traits commonly associated with exercise dependence in fitness instructors. Although this information came from two case studies on fitness instructors (Zaitz, 1989), similar findings have been revealed in quantitative studies on runners (Kagan & Squires, 1985; Rudy & Estok, 1989; Yates et al., 1983). Compulsivity is one component of the obsessive-compulsive personality, which is distinguished by a constellation of traits, defenses, and lifestyle, but not by the presence of psychiatric symptomatology (Pollack, 1979). It is considered to be a fairly common character structure within the Western culture (Pollack, 1979). Perfectionism, one feature of compulsivity, is characterized by a continuous feeling of inadequacy and a constant striving to be the best (Reed, 1985). While compulsivity and perfectionism refer to the way one relates to others and deals with situations, body image and self-esteem are personal evaluations of one's own physical attributes and general effectiveness. Body image is an integral part of one's self concept, defined as the degree of feeling of satisfaction or dissatisfaction with the various parts or processes of the body (Secord & Jourard, 1953). Self esteem can be seen as:

> The sense of contentment and self-acceptance that stems from a person's appraisal of his (her) own worth, significance, attractiveness, competence, and ability to satisfy his (her) aspirations (Robson, 1988, p.13).

It is easy to see how these characteristics may be expressed in the exercise dependent individual. Individuals will ignore personal, familial, or occupational responsibilities in order to satisfy the need for their "exercise fix" (Benyo, 1990; Morgan, 1979a). Perfectionism is reflected by striving to attain perfection in all endeavors (Hewitt & Flett, 1991), including one's workouts and body appearance. Moreover, extreme workouts may be one way the individual enhances general self esteem via greater body satisfaction (Davis & Cowles, 1991). However, rigorous testing is required to determine if these specific personality factors are associated with exercise dependence within the aerobics instructor population.

This study set out to determine whether the personality characteristics laid out by Zaitz (1989) are commonly associated with exercise dependence within a specific population. It was timely considering the current cultural emphasis on fitness and health in North America (Davis & Fox, 1993). Exercise has become the mode of choice in attaining physical wellness within our culture (Davis & Fox, 1993). Women are thus vulnerable to the development of this syndrome and need to be educated on the health risks associated with excessive exercise. This study was even more vital considering the lack of sound and systematic research in this area (Davis & Fox, 1993). The predominant use of case studies requires the use of conjecture and assumptions about the data and is considered to be a primitive design lacking rigor and generalizability (Henderson, 1991; De Vaus, 1991).

1.2 Statement of the Problem

Do those fitness instructors that score higher on exercise dependence as measured by Davis, Brewer, and Ratusny's (1993) Commitment To Exercise Scale (CES) also score higher on compulsivity and perfectionism, and lower on self esteem and body image?

1.3 Purposes and Objectives of the Study

The purpose of this study was to determine the significance and direction of the relationship between exercise dependence and certain psychological characteristics in aerobics instructors. The characteristics included here were compulsivity, perfectionism, self esteem, and body image. As previously mentioned, only two studies have looked at exercise dependence in the aerobic fitness class population, one of which claimed that perfectionism, compulsiveness, low self esteem, and poor body image are traits commonly associated with exercise dependence in fitness instructors (Zaitz, 1989). There is some evidence that these characteristics are associated with exercise dependence, but results have been divided and it has also been acknowledged that some gender differences do exist (Anshel, 1991; Kagan & Squires, 1985; Masters & Lambert, 1989). This research, also, has been primarily clinical and anecdotal in nature, and a lack of quantitative measures of some items exists. This lack of formal research on exercise dependence in aerobics instructors served as the basis for posing the following questions:

1. Do those aerobics instructors who score high on the CES score higher on measures of compulsivity, such as orderliness, perseverence, and rigidity than those instructors with low scores on the CES (Frieze, Olsen, & Good, 1990; Kagan and Squires, 1985; Pargman & Burgess, 1979; Yates et al, 1994)?

2. Do those aerobics instructors who score high on the CES score higher on measures of perfectionism than those instructors with low scores on the CES (Clark, 1991; De la Torre, 1995; Sacks, 1987)?

3. Do those aerobics instructors who score high on the CES score lower on a measure of self esteem than those instructors with low scores on the CES (Carmack & Martens, 1979; Glasser, 1976; Sacks, 1981; Rudy & Estok, 1986; 1989; Zaitz, 1989, Zerbe, 1988)?

4. Do those aerobics instructors who score high on the CES score lower on a measure of body image than those instructors with low scores on the CES (Davis & Fox, 1993; De la Torre, 1995; Holmes, Chamberlin, & Young, 1994; Mallick, Whipple, & Huerta, 1987), Sonstroem, Harlow, & Josephs, 1994; Zaitz, 1989)?

In addition to these questions, the present research sought to determine whether there is a portion of the aerobics instructor population which evidenced symptoms of exercise dependence. As no cut-off point has been established on the Commitment To Exercise Scale (CES) for "problem dependence", a descriptive approach was adopted to investigate whether a sub-set of the aerobics instructor population (e.g., those scoring one standard deviation above the mean or higher on the CES) as a group tended to have a distinctive profile on those characteristics suggested by previous authors to be symptomatic of exercise dependence (e.g., high activity level, get upset if unable to exercise, continue to exercise when feeling tired or unwell, perfectionistic, compulsive, dissatisfied with body shape and size, low self esteem). This exploratory analysis has a dual purpose:

1. to provide some insight as to whether there is a problem of exercise dependence within aerobics instructors

2. to contribute information concerning the validity of the CES for assessing exercise dependence and toward establishing a cut-off score for indicating the presence of a problematic level of dependence.

1.5 Rationale of the Study

According to Anshel (1991) and Polivy (1994), it is important to identify the personality factors associated with the development of an exercise dependence so that those most at risk can be identified and monitored. Aerobics instructors were chosen as the population of study in order to address this issue. Aerobics instructors were chosen as the research population for three reasons. First, there is a need to examine the phenomenon of exercise dependence in activities other than running (Anshel, 1991; Pierce, 1994). Second, it is important to investigate the frequency of occurrence in women since, as previously mentioned, most studies have been conducted on males (Furst & Germone, 1993). Third, as the aerobics instructor is in a position of influence for the participants in her/his class, it is possible that an instructor who overvalues physical fitness may contribute to overzealousness in the behaviors of her/his class participants. This is clearly an area which is in need of investigation. It is hoped that this research will encourage work in that direction.

1.6 Limitations of the Study

The following limitations of the study have been acknowledged. The possibility of a self-selection bias among those who return the questionnaire is difficult to resolve and may pose a threat to it's validity. It is hoped that appropriate sampling procedures minimizes this limitation.

There are limitations that come with the use of self-report questionnaires (e.g., dishonesty, inaccurracy). All assessments of personality reflect only subjects' perceptions of their own behavior and whether or not behavior is actually consistent with these assessments is unknown (Kagan & Squires, 1985).

Since this was a correlational study, causality was not established clearly. It was hoped that the use of the stepwise multiple regression, however, gave some insight into which of the psychological variables were the best predictors of exercise dependence.

Some of the data (e.g., exercise participation) were retrospective and depend on recall over a period of time (e.g., one month, one year). Poor memory recall may jeopardize the validity of the findings.

The survey questions were necessarily restricted in content and number. All data collection methods, however, are vulnerable to this problem.

1.7 Delimitations of the Study

This study was delimited to female fitness instructors. The subjects were randomly selected from a list of aerobics instructors certified through the Alberta Fitness Leadership Certification Association (AFLCA) and living in Alberta, Canada. This means that results may not be generalizable to other populations.

CHAPTER 2

Review of Literature

2.1 Introduction.

As mentioned in chapter one, exercise dependence can be defined as an unhealthy reliance or compulsive need for the next workout, not necessarily to improve performance in competition, but to deal with daily stresses and provide relief from bad feelings associated with not working out (Barrett, 1994; Benyo, 1990). This definition is based on research done on exercise dependence as well as the addictions area in general. It is this research that will be discussed in this chapter. It was also mentioned in chapter one that exercise dependence is a complex, multifacted phenomenon, involving psychological, sociological, and physiological variables. These factors will be discussed in detail in this chapter along with the methods researchers have used to measure these variables and exercise dependence. It is hoped that it will become apparent that no one is immune from exercise dependence, as it has been found in males and females of all ages (Morgan & O'Connor, 1989). However, exercise dependence has recently been linked to specific syndromes such as anorexia nervosa (Yates et al., 1983), bulimia nervosa (Katz, 1986), and the addictive personality (Kagan, 1987). The research behind these links will be discussed and conclusions regarding causality will be made.

2.2 Exercise Dependence as an Addiction.

The study of addictions provides a "veritable semantic minefield" through which one must tread carefully (Drummond, 1991, p.5). There have been so many definitions offered for the term "addiction", and the term so widely used and discussed that it is difficult to pinpoint what addiction means (Ray & Ksir, 1993). In fact, the World Health Organization (WHO) has chosen to use the term "drug dependence" rather than "drug addiction" to broaden understanding of the term and employ a more inclusive concept. Other international diagnostic classification systems, such as DSM-3R (APA, 1988), have also adopted the concept of dependence. This has only created further confusion within the addictions literature because the words addiction and dependence seem to be used interchangably in refering to the same process (Morgan & O'Connor, 1988; NIDA, 1982). The exercise literature has not been immune to this semantic confusion. In discussing exercise dependence, labels employed have included exercise addiction (Benyo,1990), positive addiction (Glasser, 1976), exercise dependence (Veale, 1987), exercise abuse (Dishman, 1985), excessive exercise (DeBenedette, 1990), morbid exercising (Chalmers, Catalan, Day, & Fairburn, 1985), and compulsive exercise (Blumenthal et al., 1985). Moreover, it has been studied more in runners than any other group, as can be seen in terms such as running addiction (Sachs, 1981), obligatory running (Yates, 1983), and habitual running (Wheeler, 1986). In agreement with Veale (1987; 1991), the label used here will be exercise dependence because it does not refer to any particular sport or activity and classifies the phenomenon with other compulsive behaviors.

It is important to distinguish clearly the definitions and uses of key terms such as dependence before discussing how each relates to exercise. One simple way of defining dependence is in behavioral terms (Ray & Ksir, 1993). According to this definition, a dependence is characterized by frequent use of the addictive substance (usually at least daily) and by the fact that a great deal of the individual's behavior is focused on using, obtaining, talking about, or collecting paraphernalia associated with the addictive substance (Ray & Ksir, 1993). Such a definition, however, misses the rich and complicated dynamics preceding the behavior, and gives little or no information about underlying psychological factors (De la Torre, 1995). Although there may never be agreement on how the term dependence should be defined, most of the current definitions are based on one or a combination of at least the following elements; tolerance, withdrawal, and psychological dependence (Drummond, 1991; Ray & Ksir, 1993).

Psychological dependence can be described in many ways, including the amount of effort an individual exerts in seeking out the object/experience, the frequency or regularity of the dependent behavior, and/or the stated craving for the object/experience (Ray & Ksir, 1993). The concept of reinforcement is also important to psychological dependence. Some experiences have the ability to reinforce the behaviors that led up to them, making those behaviors more likely to occur in the future. In this way, those experiences that have powerful reinforcing properties are considered to have the most potential for producing psychological dependence (Ray & Ksir, 1993). It is psychological dependence, based on reinforcement, that is considered the real driving force behind any addiction (Ray & Ksir, 1993).

Tolerance refers to the observation that following repeated use of the addictive object/experience there is a reduction in effect (Ray & Ksir, 1993). Therefore, the individual must continually increase the dose in order to obtain the same result. Several mechanisms have been put forth to explain tolerance, which is best regarded as a homeostatic response (Drummond, 1991). One notion is that there is a classical conditioning of responses within the body which oppose the effects of the object/experience (Siegel, Krank, & Riley, 1988). This learning occurs to environmental stimuli that are present at the time of administration in a feedforward mechanism. Effects are not only modulated by responses elicited by the object/experience but also by responses elicited in anticipation of the experience (Siegel et al., 1988).

Associated with tolerance is the phenomenon of withdrawal (Drummond, 1991). Withdrawal occurs when use of the addictive object or experience is discontinued or is no longer available (Ray & Ksir, 1993). The presence of a withdrawal syndrome is said to reflect physical dependence, but both psychological and physical symptoms may result. The nature of the withdrawal symptoms vary with the addictive element. For example, alcohol withdrawal is characterized generally by CNS excitability. Specifically , one may experience anxiety, tremor, sweating, and in extreme cases fits and delirium (Drummond, 1991). How withdrawal, psychological dependence, and tolerance pertain to exercise dependence will be discussed next.

Veale (1987; 1991) has proposed diagnostic criteria for exercise dependence which are based on the core elements of a dependence syndrome. There are seven features to the diagnosis and two associated features. These features are:

a) Narrowing of repertoire leading to a stereotyped pattern of exercise with a regular schedule once or more daily.

b) Salience with the individual giving increasing priority over other activities to maintain the pattern of exercise.

c) Increased tolerance to the amount of exercise performed.

d) Withdrawal symptoms related to a disorder of mood following the cessation of the exercise schedule.

e) Relief or avoidance of withdrawal symptoms by further exercise.

f) Subjective awareness of a compulsion to exercise.

g) Rapid reinstatement of the previous pattern of exercise and withdrawal symptoms after a period of abstinence.

h) Either the individual continues to exercise despite a serious physical disorder known to be caused, aggravated, or prolonged by exercise and is advised as such by a health professional, or the individual has arguements or difficulties with his partner, family, friends, or occupation.

i) Self-inflicted loss of weight by dieting as a means towards improving performance.

Several investigations have supported the occurrence of these psychological and behavioral characteristics associated with dependent behavior in exercise. Morgan (1979a) was one of the first to describe the depression, anxiety, fatigue and irritability that comes with cessation of exercise. Thaxton (1982) reported that runners deprived of exercise for 24 hours experienced negative effects on mood as measured by the Profile of Mood States (POMS) and galvanic skin response (GSR). This finding was replicated in later studies with fitness class participants (Napier & Briant, 1990), health club members (Anshel, 1991), male marathon runners (Morris, Steinberg, Sykes et al., 1990), and male and female recreational runners (Chan & Grossman, 1988), and includes withdrawal symptoms such as tension, confusion, anger, decreased vigor, discomfort, bloatedness, restlessness, frustration, and insomnia. These findings lend support to the notion that the occurrence of withdrawal symptoms following exercise deprivation is a critical factor in identifying exercise dependence (Veale, 1991).

The development of tolerance to running has included the need to increase frequency, distance, or duration of running in order to achieve a pre-existing level of satisfaction (Carmack & Martens, 1979; Lyons & Cromey, 1989; Masters & Lambert, 1989; Pierce et al., 1993b). It has also been found that runners with a longer exercise history score higher on a measure of exercise dependence than individuals with shorter running histories, indicating habituation to exercise (Furst & Germone, 1993; Hailey & Bailey, 1982; Pierce et al., 1993b). Similar findings have also been reported within other aerobic exercise populations (Furst & Germome, 1993; Napier & Briant, 1990). Despite this abundance of evidence, Veale (1991) has recently reexamined this criterion for several reasons. First, tolerance is a pharmacological concept and one that is difficult to apply to exercise. Second, those who are dependent on exercise do not necessarily increase their training to get the same psychological effect (Veale, 1991). Finally, the development of tolerance to exercise is difficult to distinguish from a motivation to improve performance or to lose weight (Veale, 1991). For these reasons, Veale (1991) suggests the criterion be abandoned altogether.

The elements of exercise dependence often cluster together. For example, the subjective sense of compulsion to exercise is often seen behaviorally in a stereotyped pattern of exercise and increasing priority given to exercise over other activities. This has been reported repeatedly throughout clinical research, particularly with runners (Morgan, 1979), as well as in the young (Clark, 1991) and old (Lyons & Cromey, 1989) alike. Zerbe (1988) reports this phenomenon in working with a young man who developed a rowing addiction:

> (Bob) felt increasingly compelled to work out on his rowing machine, ostensibly because he wanted to attain an elite level. He exhibited loss of control by his inability to stop rowing long enough to do other activities or have other interests in his life; he became inflexible to internal and external conditions (p.23).

This phenomenon has also been found in aerobics instructors:

> Judy has been an instructor for 5 years...(she) spends 4 to 5 hours a day in aerobic activity and another hour a day weight training. Since she also works part-time...Judy has little time or energy left at the end of the day to see friends or pursue other interests. She considers this schedule necessary to stay in top physical shape (Zaitz, 1989, p.41).

It is clear from these examples how the dependency takes control out of the hands of the individual and places it with the activity itself. This can be quite detrimental to the individual and is dealt with further in the next section.

2.3 Exercise Dependence as a Positive or Negative Addiction: Eliminating The Concept of a Positive Addiction.

Glasser (1976) looked at the benefits derived from involvement in physical activity, mostly running, as well as the euphoria and the intense commitment that many runners bring into their workout, and called it a "positive addiction." This is contrasted with the harmful physical and psychological consequences of a negative addiction, such as would come from drug addiction. He believed that through a positive addiction such as exercise, one could further their mental strength in order to gain more satisfaction in life. Glasser's contentions have received some support. Jacobs (1980) found that runners that perceived themselves as "addicted" to their activity experienced improved self esteem, increased energy, and less anxiety and depression. Similar findings were reported by Carmack and Martens (1979) in research with their Commitment to Running Scale. They coined the term "spin-out" to describe the positive changes in mental state which occur during a run (Carmack & Martens, 1979). Glasser claims that the psychological benefits of exercise derive from this "positive addiction state." He describes this state as trancelike and transcendental, where the mind is let go to "get into the run." Although it may take awhile for an individual to experience the positive addiction state, it is a state that once achieved, the person will strive to recreate (Glasser, 1976).

Despite recognition of withdrawal symptoms in subjects when deprived of their regular exercise regimen, researchers suggested encouraging the development of "positive addiction" into newcomers to exercise programs (Sachs & Pargman, 1982). Sachs (1981) stated we should develop "programs which help runners achieve optimal levels of addiction to obtain the maximum psychological and physiological benefits from participation..." (p.124). In this vein, an addiction state is created to enhance adherence. This rationale breaks down for two reasons. First, the statement was made without a clear understanding of addiction. An addiction entails "giving oneself up to a habit", that such a process could ever reach an 'optimal level' is questionable. Second, the rationale is circular. Adherence is necessary for an addiction to develop, and addiction enhances adherence.

Morgan (1979a) disputed the view of an addiction to exercise as positive because of the aberrant behavior the individual manifests when her/his daily opportunity to exercise is withheld, suggesting the individual may require a run or exercise class in order to cope with everyday stresses. He cites several case studies which show how a single activity becomes all-consuming to the point where there is little or no regard for physical injuries and responsibilities to the family, friends, or work (Morgan,1979a). Moreover, there is considerable evidence that at the level of dependence, the physical and psychological benefits of exercise disappear, and the behavior actually becomes counter-productive (Anshel, 1990; Lyons & Cromey, 1989; Rudy & Estok, 1988; 1989; Zaitz, 1989). In extreme form, the person may require help to reduce the degree of dependence on exercise (Veale, 1987; Rudy & Estok, 1989).

In order to address the lack of agreement regarding excessive exercise commitment as a positive or negative addiction, many suggest that the development of a dependence on exercise is a gradual process which falls on a continuum (Blumenthal et al., 1985; De la Torre, 1995; Morgan, 1979a; Sachs, 1982; Veale, 1987; Yates, 1991). As such, a dependency is simply an extension of ordinary behavior (Sachs, 1982). Blumenthal et al. (1985) suggest that the reasons for running can be placed on a continuum extending through use as a coping strategy for managing affect to a dependence on exercise at the extreme end. The greater the negative affect experienced in the absence of the opportunity to exercise, the greater the degree of dependence (Veale, 1987). Sachs (1982) adds that for the negatively addicted individual, exercise has progressed from an important aspect of the individual's life to a controlling factor which dominates other choices. So while the positively addicted runner retains control over the activity, the negatively addicted runner is controlled by the activity (Sachs, 1982). Concern has also been raised, however, over use of the term positive addiction. As previously stated, strict use of the term 'addiction' indicates that it may be inappropriate in conjunction with the term 'positive'. Exercise enthusiasts may experience an improvement in psychological functioning, but with excessive exercise, physical and social functioning becomes impaired (Morgan, 1979a; Veale, 1987). If it is a dependency, then by definition, it controls the individual, and when the exercise regimen begins to dominate one's life to the point where there is little regard for personal, social, or occupational responsibilities, the behavior can hardly be viewed as positive (Ray & Ksir, 1993; Rudy & Estok, 1989).

2.4 Physiological Factors in Exercise Dependence.

The physiological basis for exercise dependence is not clear and has been poorly studied (Barrett, 1994). However, several possibilities have been put forth. These include the production of endogenous opiates during exercise, elevated levels of vasopressin, or antidiuretic hormone (ADH), with compulsive exercise, and adaptive reductions in catecholamine levels.

The most common suggestion is that beta-endorphins are the physiological basis behind exercise dependence (Pierce, 1994). Beta-endorphins are a morphine-like substance naturally occuring in the blood. There are exercise-induced elevations in peripheral beta-endorphins which may reflect increases in concentrations in the central nervous system (CNS) and be associated with changes in pain perception and mood state (Schwarz & Kindermann, 1992). The relationship between peripheral levels and brain levels of endorphins, however, is vague and believed to be small because they are unable to cross the blood-brain barrier (Foley et al., 1979). The only way to directly determine if there are central changes in opioid peptides is from a sample of cerebro-spinal fluid (CSF).

Indirect evidence for central opioid activity in humans has been gained from the use of drugs, such as Naloxone or Naltrexone (Veale, 1987). Naloxone and Naltrexone are antagonist drugs which block the actions of narcotics, such as morphine or heroin (Ray & Ksir, 1993). Since endorphins occupy the same receptor sites as the opiates, Naloxone and Naltrexone are used to reverse the effects of beta-endorphins (Markoff, Ryan, & Young, 1982). Janal, Colt, Clark, and Glusman (1984) injected runners with 0.8 mg Naloxone at 20 minute intervals following a 6.3 mile run on one day, and equal volumes of saline on another day. Ischaemic pain and discriminability were significantly reduced after the run with normal saline compared to Naloxone (Janal et al., 1984). Subjects were more sensitive to pain experienced in the forearms when injected with an opiate antagonist than when injected with saline, providing some support for the view that endogenous opioid mechanisms have a hypoalgesic effect and are involved in the modulation of pain following exercise. However, a cold pressor test used to measure thermal pain sensitivity failed to show post-run hypoalgesia (Janal et al., 1984). Joy, euphoria, cooperation, and conscientiousness visual analogue scale ratings (VAS) were elevated post-run following saline injection, while only cooperation and conscientiousness ratings were elevated following naloxone injection. This provides partial support that naloxone prevented the subjects from experiencing expected elevations in joy and euphoria following a run by blocking the effects of beta-endorphins (Janal et al., 1984).

Markoff et al. (1982) used a different experimental design than the previous study to determine the relationship between aerobic exercise and endogenous opiates. Also, the Profile of Mood States (POMS) was used to measure a wider range of mood states (tension-anxiety, depression-dejection, confusion-bewilderment, vigor-activity, anger-hostility, fatigue-inertia). It was found that naloxone failed to reverse favorable changes in mood which were previously associated with beta-endorphin release during exercise (Markoff et al., 1982). Subjects filled out the POMS following their run, and were then injected with 0.8 mg of naloxone. The POMS was again presented 15 minutes later. Markoff et al. (1982) found that there were no significant differences between post-run and post-injection scores. The failure to demonstrate a naloxone effect suggests that endorphins are not entirely responsible for mood changes following the stress of exercise (Markoff et al., 1982). Given their questionable role in exercise-induced mood changes and pain perception, the role of endorphins in the aquisition of exercise dependence is also suspect. This interpretation is supported by Pierce and Eastman (1993), who failed to find support for the role of beta-endorphins in the development of a dependence on exercise. In this study, scores on exercise dependence were not related to changes in plasma beta-endorphin levels following a bout of aerobic dance exercise (Pierce & Eastman, 1993). Thus the role of endogenous opiates in the development of a dependence on exercise remains uncertain.

The endorphin hypothesis suggests that exercise dependence is a result of acute physiological changes that occur with exercise. Another possibility is that vasopressin, or antidiuretic hormone (ADH), may account for compulsive exercise (Yates et al., 1994).

Vasopressin is responsible for the retention of water in the kidneys so that less water is excreted in the urine and more water is retained in the blood. This process is stimulated by an increase in plasma osmolality during dehydration, such as would result from prolonged exercise (Fox, 1993). Evidence that elevated vasopressin levels may be responsible for compulsive exercise is primarily indirect. When vasopressin is administered in animals, it keeps them from unlearning behaviors they have previously learned, even when there is no reason to continue to perform these behaviors (Van Ree, Hijman, Jolles, & DeWied, 1985). In humans, subjects evidencing two syndromes characterized by excessive activity, anorexia nervosa and bulimia nervosa, have been shown to have abnormal levels of vasopressin in their cerebrospinal fluid (CSF) and plasma (Demitrack et al., 1992; Gold, Kaye, Robertson, & Ebert, 1983) Individuals with obsessive-compulsive disorder also have significantly elevated levels of vasopressin compared to controls (Altemus et al., 1992), and there is evidence that compulsivity is related to amount of exercise (Kagan & Squires, 1985).

Some alternate theories, for example, the sympathetic arousal/monamine hypothesis (Thompson & Blanton, 1987), do not entirely conflict with the endorphin hypothesis. This hypothesis states that exercise dependence is mediated by adaptive reductions in sympathetic output (i.e., catecholamines) to exercise as a result of training, requiring the individual to engage in increasing levels of activity in order to produce pre-training levels of physiological arousal (tolerance). Repeated exercise behavior is thus said to be maintained by sympathetic arousal. This involves elevations in the catecholamines norepinephrine and epinephrine, chemicals or hormones in the blood involved in arousal, such as the "fight-flight" response. Low levels of norepinephrine have been associated with depression in both humans and animals (Morgan, 1985). According to this view, individuals are motivated to exercise to experience the arousal-inducing properties of these circulating catecholamines. With training, hormonal changes occur to promote energy conservation which produce a change in the dose-response curve, requiring the individual to engage in greater levels of activity to counteract the lowered output of catecholamines and produce the same level of physiological arousal (Thompson & Blanton, 1987). Withdrawal occurs when metabolic processes return to pre-exercise levels. As a result of the contrast between exercise and post-exercise levels of arousal, the individual feels uncomfortable, irritable, lethargic, which produces a drive to engage in further exercise behavior (Thompson & Blanton, 1987). Moreover, as a result of sympathetic adaptation, this resting arousal state is sub-basal, so the catecholamine levels and metabolic rate is lower than pre-training levels. Definitive research regarding the physiological basis of exercise remains to be done, and it may be found that these mechanisms act synergistically rather than in an either-or manner (Morgan, 1985).

2.5 Psychological Correlates of Exercise Dependence.

Perhaps the most important component in creating an exercise dependence is the psychological component (Zerbe, 1988). A number of psychological variables have been considered as relevant to exercise dependence. Before discussing these, it is first necessary to understand that a person is addicted to an experience, not a chemical (Peele, 1981). This is true whether the dependence is on alcohol, smoking, eating, or any other addiction

(Donovan, 1988). In terms of exercise dependence, we must take into account a person's need for the exercise experience and how that experience fits into those needs (Peele, 1979). One suggestion is that one will develop a dependence on exercise during periods of emotional stress, during which exercise is used as a coping or avoidance mechanism (Peele, 1991; Sacks, 1981). This was supported by Robbins and Joseph (1985), who found that "addicted runners" use exercise as an escape activity in order to avoid life's stressors.

Associated with all dependencies, including exercise dependence, is a lack of confidence and low self esteem (Peele, 1981; Twerski, 1990). Self esteem can be seen as:

> The sense of contentment and self-acceptance that stems from a person's appraisal of his (her) own worth, significance, attractiveness, competence, and ability to satisfy his (her) aspirations (Robson, 1988,p.13).

Glasser (1976) described how an "addiction" to exercise leads to psychological wellbeing. Carmack and Martens (1979), using their Commitment to Running (CR) Scale, also found a positive association between self esteem and "exercise addiction." High CR runners were more likely to perceive that they derived a positive self-image from running than low CR scorers (Carmack & Martens, 1979). This implies that running can be used successfully to enhance self esteem. However, more recent research suggests that the relationship needs to be looked at in more detail. For example, Sacks (1981) describes how physical activity is used as a coping response to losses to self esteem and how this ineffective coping mechanism may precipitate an addiction to exercise rather than enhanced self-esteem. This is partially supported by correlational studies carried out by Rudy and Estok (1986; 1989). In one study looking at the physical, psychosocial, menstrual changes/risks, and addictive behaviors associated with running, a negative correlation was found between addiction scores and self esteem. Those women who scored higher on a Running Addiction Scale (RAS) tended to have lower scores on the Rosenberg Self Esteem Scale (Estok & Rudy, 1986). It was also found that female marathon runners reported significantly more addictive behaviors than did female nonmarathon runners (Estok & Rudy, 1986). This finding was supported in a replication study, where the focus was again on runners (Rudy & Estok, 1989). Case studies presented by Zaitz (1989) and Zerbe (1988) indicate that low self-esteem and poor body image are both problematic issues for those who exercise excessively.

Body image is considered to be an integral part of self concept, particularly amongst exercising women (Davis, 1990). It can be defined as the degree of feeling of satisfaction or dissatisfaction with the various parts or processes of the body (Secord & Jourard, 1953). Some studies have shown a positive correlation between body image and amount of exercise (Davis & Fox, 1993; Holmes, Chamberlin, & Young, 1994; Mallick, Whipple, & Huerta, 1987), while others found a negative relationship (De la Torre, 1995; Sonstroem, Harlow, & Josephs, 1994; Zaitz, 1989). One interesting finding is reported by Davis and Fox (1993), who noted that excessive exercisers reported greater body satisfaction than their nonexercising counterparts, but also showed higher scores on body focus. Excessive exercisers displayed an "extreme and obsessive interest in matters concerning their body - either how it looks or how it performs" (Davis & Fox, 1993, p.209). Similarily, Sonstroem, Harlow, and Josephs (1994) found that although aerobic dance and exercise involvement was associated with positive self-evaluations of one's physical condition, it was also associated with more negative thoughts about one's body attractiveness. De la Torre (1995) suggests this body focus is even more specific in exercise abusers in that the self becomes replaced by idiosyncratically chosen body parts which are overvalued by the individual. This may be the case particularly for female excessive exercisers (Pasman & Thompson, 1988).

A number of studies have investigated how compulsivity contributes to the development of exercise dependence (Kagan & Squires, 1985). Compulsivity is considered to be a fairly common character structure within the Western culture (Pollack, 1979), and is one component of the obsessive-compulsive personality. It is distinguished by a constellation of traits, defenses, and lifestyle, but not by the presence of psychiatric symptomatology (Lazare, 1979). For example, Yates et al. (1994) suggest that individuals are at risk of overcommitment to exercise if they are persistent, perfectionistic, high-achieving persons. This statement was supported by another study which found that high-achieving persons are far more likely to exercise and to do so compulsively (Frieze, Olsen, & Good, 1990). These characteristics (perfectionism, persistence, and strong achievement orientation) are characteristics of the obsessive-compulsive personality (Pollack, 1979). It has been suggested that a person with compulsive tendencies is more prone to engaging in addictive actions, such as exercise (Pargman & Burgess, 1979). Support for a connection between "obligatory running" and obsessive-compulsiveness was found by Goldfarb and Plante (1984) in a group of male and female distance runners. However, Kagan and Squires (1985), who studied a broader base of activities (walking, bicycling, jogging, running, aerobics, weights, basketball, racquetball), found that compulsiveness was related to amount of exercise in men but not in women.

Some authors believe that excessive exercise should be categorized as an obsessive-compulsive disorder rather than a dependency (Yates, 1991). The arguement here is that a true addiction is ego syntonic, the individual enjoys the addictive experience and does not want to stop. Compulsions, on the other hand, are ego dystonic whereby one does not enjoy what she/he is doing but rather feels compelled to continue. These people fear losing self control if they do stop (Yates, 1991). Some feel that this description of compulsivity best describes the motivation behind excessive exercise, and there is some reason to believe that it does (Veale, 1987). This arguement, however, fails to take into consideration that several definitions of dependence include as part of their criteria *a subjective awareness of a compulsion to experience the addictive substance/experience* (Donovan, 1988; Drummond, 1991; Ray & Ksir, 1993). In fact, this has been described by some as the "paradox of control" (Donovan, 1988; Marlatt & Gordon, 1985). On the one hand, the addictive behavior is one that the individual uses to exert control over and cope with life. On the other hand, the behavior is often described as excessive and out of control. The behavior is under the control of conditioned stimuli within the setting, and the reinforcing properties of the addictive experience (Donovan, 1988). The paradox, then, is the lack of self-control over a behavior that is used by the addicted person to exert control over other aspects of life. Compulsivity, then, is inherent in all dependencies.

Perfectionism is one feature of compulsivity, characterized by a continuous feeling of inadequacy and a constant striving to be the best (Reed, 1985). Perfectionism is a trait which is closely linked with achievement (Yates et al., 1994). There is considerable clinical research looking at the link between perfectionism and exercise (Davis, 1990), and perfectionism and exercise dependence (De la Torre, 1995; Goldfarb & Plante, 1984; Kagan & Squires, 1985; Krejci et al., 1992). Clark (1991) reports a case study of a young woman she described as a "compulsive exerciser disguised as a dedicated athlete" (p.18). This young runner was a perfectionist who needed complete control in her life and to be the best at whatever she pursued, even though whatever success she attained was never enough (Clark, 1991). De la Torre (1995) also presents two case studies of men whose pursuit of physical perfection made it impossible to obtain lasting gratification; with each new workout came the need to reconfirm their strength, muscle volume, and stamina. More research is required to narrow down and isolate this "narcissistic dynamic" behind the excessive pursuit of physical effectiveness (Sacks, 1987).

2.6 Sociocultural Considerations in Exercise Dependence.

One researcher writes:

> Very little has been written about compulsive (exercise) in either the professional or lay literature, but it is increasingly observed as a real problem in our exercise-minded and perfectionistic society. (Zerbe, 1988, p.22).

This statement is saying that it is essential to look to society and the salient societal values, since both have powerful influences on people, and their power is a large part of the story of addiction (Peele, 1989). Other researchers have agreed that addictive urges often grow out of society and an overzealous adherence to values expressed within it (Benyo,1990; Peele,1979; 1985). There are a host of values that promote exercise dependence within North American society. Yates et al. (1994) mention excessive achievement orientation, while others look at narrowly defined cultural standards which lead to dissatisfaction with the body (Davis, 1991; Yates et al.,1994).

Benyo (1990) discusses several values engrained within North American culture which, when taken to extremes, encourage the development of a dependence on exercise. These include:

1. the need for instant gratification
2. a strict adherence to the Puritan work ethic
3. belief in martyrdom.

According to Benyo (1990), the desire for instant gratification is reaching epidemic proportions within our society, while patience and long-term goals are becoming a thing of the past. No class or occupation is immune, including the fitness industry. Whenever the aerobics instructor teaches a good class, she/he receives social reinforcement in the form of praise. Everytime she/he looks in the mirror and sees a person with a toned, healthy body looking back, or walks into the room and someone comments on how fit she/he looks, there is further reinforcement (Benyo, 1990). What the aerobics instructor has found, then, is a source of instant and continuous gratification, which is not only intoxicating, but addicting. Combine this with the knowledge that the more hard work, the greater the rewards, and the potential for dependence is enhanced. The Puritan work ethic is the philosophy that you get what you work for, and the harder the work, the better the results. There is no doubt that doing well at physical activities requires the investment of substantial time and effort, but one's progress is easily measured by perceivable results, such as weight loss, improved running time, or increased strength (Benyo, 1990). Finally, Benyo (1990) discusses how sport and exercise are saturated with the philosophy of "No pain, no gain!" In other words, there will be reward for your suffering, such as occurs when an individual trains through an injury.

From Benyo's (1990) discussion, it is a small step to the conclusion that we live in a compulsive and self-conscious society, partly catalysed by images presented by the media. These images project powerful social pressures to be thin, particularly to women (Eisler & LeGrange, 1990). Even women who are already active and slender want to lose weight (Davis & Cowles, 1991). One researcher states:

> It is generally agreed that the current unrealistic standards of feminine attractiveness, and the overemphasized health benefits of slenderness are important factors responsible for the increase in both dieting and exercise in recent years...Furthermore, exercise can serve to focus exaggerated attention on one's body and on the relationship between weight and maximal performance (Davis, 1991, p.2).

One result of the current emphasis on health and fitness is that people are more preoccupied with body image and less satisfied with what they are seeing in the mirror (Restak, 1987;Yates et al.,1994). The body is used as a fashion statement and an indication of how hard one works at self improvement (Rodin,1992). In this way, society encourages the prevalence of concerns like,"Do I look fit enough?" rather than,"Am I fit?" (Rodin,1992). It is most likely the person addicted to exercise would answer negatively to both questions. A dependence on exercise is thus an expression of personal principles, which simply reflect dominant cultural values of martyrdom and narcissism. Yet, as social beings, it is only natural to be responsive to such powerful social norms.

Factors such as a lack of a supportive social group and growing up in a dysfunctional family also increase the likelihood of "exercise abuse" (Brehm, 1992; Peele, 1989). One case study reported by Clark (1991) discussed a young woman who had grown up with alcohol problems in the family, but instead of being an alcoholic like her father, she was an" exercise-aholic and a study-aholic" (pg.18). This can be attributed at least in part to the fact that a disturbed family fails to provide the support, encouragement, and opportunity for growth that children need to develop self-efficacy and self-esteem (Peele, 1989). Thus, it is an individual's relationship to society in general, and to her/his family and friends in particular, that either helps keep healthy behaviors in place or promotes the development of addiction (Peele, 1985).

2.7 Measurement of Exercise Dependence.

There has been little consistency in the measurement of exercise dependence (Pierce, 1994). Some studies have taken a qualitative approach while others have used a more objective, quantitative method of gathering data. Furthermore, many of the quantitative measures utilized have been of questionable validity. For example, many studies have used a behavioral measure of exercise frequency or a self-reported addiction score (Carmack & Martens, 1979; Chapman & DeCastro, 1990; Napier & Briant, 1990). Simply recording the amount of time or distance performed during an exercise session is problematic because it is not necessarily indicative of an addictive state (Hauck & Blumenthal, 1992). To indiscriminately attach labels of "compulsive" or "dependent" to those who train rigorously overlooks the rich and complicated psychological dynamics motivating the behavior (De la Torre, 1995). Moreover, many competitive and amateur athletes train for hours and may run extensive distances because of a rigorous training regimen set out by a coach, not because of a compulsive need to exercise (Crossman et al., 1982). Self-report measures are questionable because quite often what the subjects are reporting on is unclear (Eisler & Legrange, 1990).

Studies measuring exercise dependence qualitatively have used interviews (Sachs & Pargman, 1979) and case studies (Lyons & Cromey, 1989; Morgan, 1979a; Zaitz, 1989; Zerbe, 1988). Sachs and Pargman (1979) used an indepth interview approach to study what they defined as "an addiction of a psychological and/or physiological nature, upon a regular regimen of physical activity..." (p.143). Morgan (1979a) wrote about eight case studies describing the undesirable concomitants of exercise dependence in runners, while others have wrote about the syndrome in rowers (Zerbe, 1988) and aerobics instructors (Zaitz, 1989). Pierce (1994) notes, however, that the validity of interviews and case studies in measuring a syndrome with poorly defined characteristics is unclear. Such techniques also tend to be time consuming, expensive, difficult to quantify, subject to interpretation, and rely on self-reported recall or anecdotal reporting (Blumenthal et al., 1984; Pierce, 1994). As a result, many researchers have turned to more quantifiable measures of exercise dependence.

A few questionnaires have been developed for the purpose of objectively measuring exercise dependence. Carmack and Martens (1979) developed the Commitment to Running Scale, which is a 12-item, 5-point Likert scale measure of what they saw as a positive addiction to running. The reliability coefficient and test-retest reliability coefficients have both been reported as quite high, .97 and .84 respectively. However, this scale has been criticized for several reasons (Hauck & Blumenthal, 1992). For example, the scale purportedly measures positive addiction. Yet several items can be construed as negative components of addiction, such as discomfort experienced when a run is missed (Rudy & Estok, 1989). Also, the scale is a measure of commitment to exercise, not dependence on exercise. Yet findings have been used to describe "addicted athletes", not commited athletes, even though both have been shown to represent separate entities (Chapman & DeCastro, 1990; Thaxton, 1982). Commitment scores do not significantly correlate with self-reported addiction scores (Thaxton, 1982). One suggestion is that motivation for exercising may be placed on a continuum with addiction/ dependence at one end and commitment/dedication at the other end (Pargman, 1982). Also, Carmack and Martens (1979) never operationalised the term "addiction" for subjects, which is further reason to question the relationship between commitment and addiction.

Hailey and Bailey (1982) developed the Negative Addiction Scale (NAS) to measure degree of dependence in a group of runners. This is a 14-item scale which yields one addiction score ranging from 0 (low) to 14 (high). The scale is a quantitative measure of "psychological rather than the physiological aspects of negative addiction" (Hailey & Bailey, 1982, p.152). However, some limitations of the scale have been noted. Firstly, the scale does not distinguish between the presence or absence of exercise dependence, just varying degrees of dependence. Moreover, there is no clear score at which a person would be considered addicted (Furst & Germone, 1993; Hailey & Bailey, 1982). Finally, the authors failed to provide any information regarding the validity or reliability of the scale. The authors acknowledge that the scale needs further refinement (Hailey & Bailey, 1982).

Rudy and Estok (1986; 1989) developed and tested two forms of their Running Addiction Scale (RAS), resulting in a final form with seventeen 3-choice Likert items. The authors reported a Cronbach's alpha of .66 and a test-retest reliability of .71 for the scale (Rudy & Estok, 1989). Scores on the RAS were found to be negatively correlated with a measure of self-esteem (Rosenberg's Self-Esteem Scale, 1965) and positively correlated with anxiety, as measured by Zuckerman's Anxiety Adjective Checklist (AACL) (1960). The authors acknowledge that the tool needs further refinement and testing (Rudy & Estok, 1989).

Chapman and DeCastro's (1990) Running Addiction Scale (RAS) was developed to investigate the psychological correlates of running addiction. The RAS consists of 11 items which purport to measure characteristics such as withdrawal experiences and the urge to run. A coefficient alpha of .82 was reported, indicating an acceptable level of reliability. Scores on the scale were found to be strongly correlated with self-rated addiction (.664, $p<.05$) and discomfort when a scheduled run was missed (.475, $p<.05$) in males. However, only self-rated addiction was significantly correlated with RAS scores in women (.753, $p<.05$). Problems with basing the validity of an instrument on self-rated scores have been considered (Hauck & Blumenthal, 1992), because unless an operational definition of addiction is given, it is uncertain what the individual is measuring. No such definition was given for the subjects in this study.

Davis et al. (1993) developed the Commitment to Exercise Scale (CES). This is a measure of the obligatory and pathological aspects of exercising. "Obligatory" describes the aspect of exercise whereby "psychological well-being is contingent upon assiduous adherence to a regular and structured exercise regimen" (Davis et al., 1993, p.621). "Pathological" exercise was defined as exercise that is continued in the face of adverse circumstances, and that takes place over other social components in one's life (Davis et al., 1993). The authors report a Cronbach's alpha coefficient of .77. Scores on the CES were found to be significantly related to scores on a number of scales measuring personality and psychological variables implicated as risk factors in the etiology of excessive exercise (weight preoccupation, obsessive - compulsiveness, addictiveness) (Davis et al., 1993).

There are several ways that future projects could improve on the present exercise dependence literature. First, there is a need for more adequate psychometric validation of scales being used (Hauck & Blumenthal, 1992). Second, there is insufficient evidence that individuals comprising the validation samples are truly dependent on exercise. For example, following completion of their Running Addiction Scale, Chapman and DeCastro (1990) asked individuals to rate on a 1 to 7 Likert scale the degree to which they considered themselves to be addicted to running. However, the term "addiction" was not operationalised for the runners which makes it difficult to establish degree of dependence based on information received. Finally, validation studies would benefit from the use of larger and random samples (Masters & Lambert, 1989).

2.8 Excessive Exercise and the Eating Disorders.

There are several lines of research exploring the relationship between compulsive exercise and the eating disorders (Eisler & LeGrange, 1990; Polivy, 1994). The models can be summarized as follows:

1. Exercise dependence is a variant of the eating disorders.
2. Anorexia nervosa and exercise dependence are both related to another underlying disorder, such as obsessive-compulsive disorder or affective disorder.
3. Anorexia nervosa and exercise dependence overlap and excessive exercise can lead to anorexia nervosa.
4. Exercise dependence and anorexia nervosa form distinct groups and the similarities noted are only superficial.

One of the more controversial lines of research is that conducted by Yates and colleagues (1983; 1991; 1992; 1994). According to these researchers, habitual running is the male analogue of anorexia nervosa in women (Yates, 1983). This idea is based on the fact that commonalities were found between those classified as obligatory runners and women who had previously been diagnosed with anorexia nervosa (Yates, 1983). Both groups were interviewed and said to be characterized by tendencies toward perfectionism, introversion, depression, and were hard workers who aimed for high achievement (Yates, 1983). However, this work has been criticized on methodological grounds (Blumenthal et al., 1985; Callen, 1987), and is considered unacceptable by today's standards for scientific research. For example, claims were made that the two groups shared personality characteristics even though no objective data were reported (Blumenthal et al., 1984).

There was also no data provided about age, socioeconomic status, marital status, or past history of the subjects. There were no standardized interview formats or known scales used, and no control group for comparison (Callen, 1987). It is no wonder, then, that several researchers have since failed to find any similarities between these two groups (Davis & Fox, 1993; Krejci, Sargent, Forand, Ureda, Saunders, & Durstine, 1992; Nudelman, Rosen, & Leitenberg, 1988; Wheeler, Wall, Belcastro, Conger, & Cumming, 1986).

Nudelman et al. (1988) found significant differences between a group of high-intensity male runners and women diagnosed with bulimia nervosa on eating attitudes, body image, depression, and self-esteem. However, no measure of psychological dependence on exercise was used, not to mention the difficulty in making comparisons between a well-functioning male population and a patient population consisting of women (Yates et al., 1994). It has been argued that female patients should be compared to dependent athletes who are also females (Polivy, 1994). Yet even when more appropriate comparisons have been made, significant differences between the two groups remain. Krejci et al. (1992) found significant differences between female bulimic subjects and female obligatory exercisers on measures of drive for thinness, body dissatisfaction, ineffectiveness, depression, perfectionism, interpersonal distrust, and interoceptive awareness, and concluded that the two groups did not resemble one another. Davis and Fox (1993) made similar comparisons in a nonclinical group of women, and concluded that while there may be a causal link between excessive exercise and weight preoccupation for some women, these associations do not appear to describe the majority of women.

Only a small percentage of excessive female exercisers were classified as strongly weight preoccupied as measured by the Drive for Thinness (DT) subscale of the Eating Disorder Inventory (Garner & Olmsted, 1984).

More recently, Yates (1991) has claimed that excessive exercising and eating disorders are "sister activities," and strongly related to obsessionality. Both, according to Yates (1987), could also represent the current cultural translation of an old condition: asceticism. Yates (1987) writes:

> The term asceticism is derived from a Greek word that means practice or training for the attainment of an ideal or goal ... In the English language, asceticism commonly implies a religious exercise, involving difficulty or pain, which leads to the conquest of the body or the spirit (p.203).

This line of reasoning vaguely resembles the second model which states that the similarities between exercise dependence and anorexia nervosa are just artifacts of a third underlying disorder (Polivy, 1994), such as obsessive-compulsiveness. According to this perspective, both syndromes can be conceptualized as obsessive-compulsive conditions upon which concerns with food and weight or "fitness" have been super-imposed (Powers, 1987). This was partially supported by Goldfarb and Plante (1984), and more recently by Davis et al. (1995). Both studies concluded that obsessive-compulsiveness was significantly and positively related to anorexia nervosa and to activity level among high-level exercisers and runners. This indicates that there may be a connection between compulsivity and excessive dieting as well as between compulsivity and exercise. It has been argued, however, that this model simplifies the relationship between excessive exercise and eating disorders and to date there is little research to support it (Eisler &

LeGrange, 1990). A more comprehensive view of both syndromes needs to take into account their multifactorial and multidimensional nature, and it is necessary to recognize the danger of both syndromes rather than glorifying them as a form of asceticism (Cohen, 1987).

There is another controversial line of research which states that excessive exercise may lead to anorexia nervosa (Eisler & LeGrange, 1990). According to this model, excessive exercise develops out of normal, healthy exercising, and at a high point leads to addiction to starvation or food-reduction brought on by heavy exercise (Polivy, 1994). Epling and his colleagues (1983; 1984; 1986; 1989; 1991) provide the bulk of the research along these lines. According to these researchers, the current cultural emphasis on health and thinness affects eating patterns and encourages physical activity. When such strenuous exercise is performed, it works to suppress appetite, which decreases the reinforcing value of food and thus food intake (Epling & Pierce, 1988). As a result, body weight declines and the motivational value of activity increases, which leads to further physical activity and reductions in the value of food. The importance of excessive activity to the onset of anorexia has been established in animals (Epling & Pierce, 1984) and humans (Katz, 1986; Lyons & Cromey, 1989). However, research indicates that behaviors involving dieting and food restriction occur prior to increased physical activity (Beumont, Touyz, & Hook, 1984), not vice versa. In the laboratory, the process of activity anorexia begins when the food schedule is restricted (e.g., food is only available for 1 hour every 24 hours) (Epling & Pierce, 1984). How applicable this process is to the development of a dependence on exercise, then, is questionable. It could be that not everyone who becomes dependent on exercise experiences simultaneous food deprivation and loss of weight. Moreover, the motivation behind initiation of exercise is not necessarily weight loss.

Veale (1987; 1993), based on extensive clinical experience, maintains that exercise dependence can be easily differentiated from anorexia/bulimia nervosa if diagnostic criterion are adhered to. In making this differentiation he referred to primary and secondary exercise dependence. A diagnosis of primary exercise dependence is differentiated from an eating disorder with associated excessive exercise (secondary exercise dependence) by virtue of fundamental differences in the purpose of the exercise (Davis & Fox, 1993; Veale, 1987). In primary exercise dependence, exercise is an end in and of itself and any dieting or weight loss is used to improve performance. On the other hand, excessive exercise in secondary exercise dependence is a means towards losing weight or balancing the intake of calories in order to improve appearance (Veale, 1987). When both dieting and exercise are prevented, such individuals are more likely to complain about the increased food intake than about the lack of physical activity (Eisler & LeGrange, 1990). In this manner, a diagnostic hierarchy is set up whereby a diagnosis of primary exercise dependence is made only when anorexia nervosa and bulimia nervosa are ruled out. Therefore, what Yates terms "obligatory exercise" in the following quotation would be diagnosed as "secondary exercise dependence" by Veale: "Obligatory runners use running to control their weight. They employ running in place of dieting, to make dieting more effective, and as an antidote to eating" (Yates, 1991; p.42).

The available data does little to distinguish between these four models, primarily due to methodological deficiencies (Eisler & LeGrange, 1990). The most pervasive problem is choice of comparison groups, such as when long-distance runners are compared with a group of patients with anorexia nervosa (Blumenthal et al., 1984), or when studies compare athletes with different levels of commitment to their sport ("high" vs. "low" mileage runners) rather than on varying levels of dysfunction (pathological and/or obligatory dependence on exercise vs. healthy habit) (Davis et al., 1993; Peele, 1981; Wheeler et al., 1986). Another methodological problem inherent in research linking eating disorders and exercise dependence is the use of unsatisfactory sample sizes. Eisler and LeGrange (1990) point out that samples typically are not large enough to provide satisfactory comparative group data, nor have they provided sufficient in-depth information about individual cases to provide the kind of information received from case studies. The same authors also caution against the application of questionnaires developed for specific populations to a normal population. Because of methodological issues such as these, direction of causality, if any, between the eating disorders and exercise dependence remains to be established.

2.9 Direction of Causality.

For the last three decades, researchers have attempted to determine the origins of exercise dependence. In doing so, several possibilites have been addressed:

1. Does regular exercise lead to addictive exercise, fostering a heightened degree of body narcissism and a critical concern with performance?
2. Do those who exercise excessively have an addictive personality (Sacks, 1986)?
3. Do individuals who possess certain characteristics tend to gravitate to vigorous sport

and physical activity involvement (Davis, 1990)?

Most of the research in this area has looked at the role of excessive exercise in eating disorders. Typically, weight preoccupation and involvement in physical activity have been seen as related in so far as exercise may be used as a method of calorie expenditure and appetite suppression (Davis, 1990). More recently, researchers have suggested that physical activity may not always be secondary to weight concerns, but can occupy a central role in their development and possibly the aetiology of clinical eating disorders (Davis, 1990). According to Katz (1986), the initial weight loss and improved muscular tone that usually accompanies strenuous exercise elicits certain biological and social reinforcers which can lead, in certain individuals, to an increased narcissistic investment in the body. When exercise is combined with a competitive spirit, it may lead to an even greater commitment to exercise.Goldfarb and Plante (1984) used a Running Zealousness scale and found that as runners became more zealous, they also became more obsessive, perfectionistic, and anxious. Davis (1990) found no significant differences between a group of exercising women and non-exercising women in weight preoccupation. However, in the nonexercising group, Body Mass Index (BMI), but not subjective body shape, predicted weight preoccupation while in the exercising group the opposite was true. Subjective body shape influenced weight preoccupation for the exercising group, not BMI. Davis (1990) concluded that dedication to regular exercise fosters a heightened degree of body narcissism and focuses attention on the relationship between body shape and maximal performance. Unfortunately, the correlational nature of these studies prevents drawing any conclusions regarding causality.

One other explanation is that individuals with an "addictive personality" tend to abuse exercise just as they would cigarettes or drugs. For years, researchers sought empirical evidence of a single configuration of traits that distinguish addicts (cigarette, alcohol, drug, etc.) from moderate users (Kagan & Squires, 1985). Kagan and Squires (1985) sought to determine whether individuals who are dependent upon a regular regimen of exercise share certain personality traits with other kinds of addicts. Subjects were asked to fill out a battery of personality tests, as well as to provide information about the use of exercise and other substances such as alcohol, tobacco, and drugs. In general, the more times per week subjects exercised and the more miles they ran, jogged, or walked, the more strongly they tended to reflect an addictive profile on the MacAndrew Scale, which is a measure of general addictive tendency (Kagan & Squires, 1985). Males who exercised the most also tended to be relatively rigid and compulsive, while amount of exercise among females was associated with Type-A behavior (Kagan & Squires, 1985). However, the authors acknowledge that the correlational design of the study precludes determining whether they were "addictive personality types" before or after starting to exercise. A later study by Kagan (1987) found that alcoholics, compulsive gamblers, chronic runners, and smokers have significantly different personality profiles as measured by the MacAndrew scale. Kagan (1987) concluded that there is a need to qualify any statement regarding a common addictive personality, as findings indicate that there may well be different addictive personality profiles. Research from addictions studies in general tend to support this conclusion. Although "the addictive personality" was once considered the primary, if not exclusive, cause of abuse and dependence, the concept is now considered to be an oversimplistic, univariate explanation of dependence (Cox, 1985; Rydelius, 1983).

One other possible explanation is that regular or obsessive exercise intensifies and exaggerates certain characteristics that are already present to a certain degree (Davis, 1990). Most researchers admit that eating disorders and excessive weight concerns do not occur merely because of unrealistic cultural standards of female beauty or because of social pressures to diet (Davis, 1990). Nor does it seem logical that the adoption of a regular exercise program necessarily precedes the development of weight concerns and obsessive exercise. However, it is feasible that certain people are psychologically vulnerable and therefore more responsive and susceptible to environmental influences (Davis, 1990).

Little (1969) was one of the first researchers to come to the conclusion that psychological vulnerability precedes the development of exercise dependence. He noted that neurotic subjects fell into two extreme categories with respect to athleticism; athletic neurotics and nonathletic neurotics. Athleticism is defined as one's personal valuation of physical prowess (Little, 1969). The premorbid personalities of the neurotic athletes were significantly more healthy than those of the nonathletic neurotics. Little (1969) concluded from this that the exaggerated athleticism was masking or replacing neurotic characteristics which were already present. It was when athleticism became threatened or diminished that neurotic tendencies became apparent in these athletes. Athleticism in and of itself is not problematic, according to Little (1969), but overvaluation of physical prowess will make individuals vulnerable to this syndrome. In another study comparing running and anorexia nervosa, it was concluded that athletes who are high achieving, hard working, and idealistic, put themselves at high risk for developing certain disorders (Yates et al., 1983). Dishman (1985) concurs that there is more of a tendency for exercise abuse in those predisposed to psychological disturbance, particularly those without a strong self-identity. Regular exercise contributes only partly, then, to the development or intensification of attention on body image and body performance.

2.10 Summary.

Exercise dependence is a good example of pursuing a positive sensation beyond all reasonable limits. For the "negatively addicted" individual, exercise is no longer an important aspect of one's life, it dominates life. Exercise becomes a controlling factor which governs other choices and takes control out of the hands of the individual and places it with the activity itself. It seems that beyond a certain level of exercise there is a reversal of the physical and psychological benefits, and the behavior actually becomes counter-productive.

Similar to anorexia nervosa and bulimia nervosa, exercise dependence is primarily a middle-class addiction (Peele, 1989). Hypotheses regarding the relationship between compulsive exercise and the eating disorders were discussed, one of which suggested a diagnostic hierarchy. In this manner, a diagnosis of exercise dependence is made only when anorexia nervosa and bulimia nervosa are ruled out. It was also discussed how certain people are psychologically vulnerable to the development of a dependence on exercise. One may develop a dependence on exercise during periods of emotional stress or as a coping response to losses to self esteem or poor body image. These individuals are seen as more responsive and susceptible to environmental influences which advocate the importance of the relationship between being thin and being fit, and more importantly, being acceptable. A dependence on exercise is not simply an expression, but an exaggeration of personal principles and cultural values.

The endorphin hypothesis of exercise-induced euphoria has been both supported and rejected, depending on the investigations one chooses to cite (Morgan, 1985). For this reason, other hypotheses which attempt to explain the mood enhancing effects of exercise and how these relate to the concept of exercise dependence were considered. Other possible explanations included elevated vasopressin levels and Thompson and Blanton's (1987) sympathetic arousal/monamine hypothesis (Thompson & Blanton, 1987).

CHAPTER 3

Methodology

3.1 Sample.

Respondents were certified fitness instructors living in Alberta. Individuals were certified through the AFLCA (Alberta Fitness Leadership Certification Association). The AFLCA is a non-profit organization responsible for the training and certification of fitness leaders and trainers in Alberta. This organization offers an up-to date list of all aerobics fitness instructors presently certified. Participation was voluntary and informed consent solicited through a cover letter attached to the questionnaire.

An aerobics instructor in this study was defined as one who teaches aerobic fitness classes. These classes may include step aerobics, slide aerobics, high/low impact aerobics, bodytoning, aquafit, or a combination of these. Analysis was restricted to responses from female fitness instructors. Instructors had varying levels of expertise and teaching experience. Basic demographic information requested from participants included age, gender, education level, employment status, household income, marital status, and personal health status.

3.2 Design.

This research was correlational and descriptive in nature. A questionnaire-style survey was developed and several variables were considered in relation to exercise dependence. How self esteem and body image vary with exercise dependence was studied. Also, the degree of compulsivity and perfectionism among high exercise dependence scorers and low dependence scorers was analyzed.

3.3 Data Analyses.

Data were summarized and analyzed using descriptive statistics. This included total scores on each of the psychological scales, as well as some individual items on the Commitment to Exercise Scale. Pearson product-moment correlations were calculated on the entire sample to examine relationships between exercise dependence and compulsivity, perfectionism, self esteem, and body image. Also, stepwise multiple regression was used to determine how well exercise dependence scores were predicted from scores on each of the psychological scales. Initially, scores were analyzed as a continuous measure. This is because there is no cutoff score set for this scale above which a person is considered dependent. Then a cutoff score for exercise dependence was set at one standard deviation above the mean. Motivational and psychological scores of those who scored above and below this mean were compared.

3.4 Measures.

The questionnaire devised includes the following scales. These scales were adopted for the research because they are valid and reliable measures of the psychological characteristics considered to be central to exercise dependence by Zaitz (1989).

1.Exercise Dependence: Exercise dependence was assessed using Davis et al.'s (1993) Commitment to Exercise Scale (CES). This eight-item scale reliably measures the psychological and behavioral aspects of excessive exercising (alpha= .77). Below each item there is a horizontal line (155 mm) with appropriate bipolar adjectives placed at each end (e.g., "never," "always"), and subjects were asked to mark the point which best described their position on the continuum (Davis et al., 1993). The distance from the beginning of the line to the point marked constitutes the score for each item. The content validity of this measure has been established through the generation of items based on a thorough review of relevant literature (Davis et al., 1993). The construct validity was determined by establishing correlations between scores on the CES and scores on a number of scales measuring personality and psychological variables implicated as risk factors in the etiology of excessive exercise (weight preoccupation, obsessive - compulsiveness, addictiveness, Davis et al., 1993). A factor-analysis of the items on the Commitment to Exercise Scale (CES) identified two moderately correlated factors (.42), one which assesses the obligatory aspects of exercising and one which assesses the pathological aspects of exercising (Davis et al., 1993)[1].

2.Compulsivity: Compulsivity was assessed using the obsessive-compulsive (O-C) subscale of the SCL-90 (Derogatis, Lipman, & Covi, 1973). This subscale measures behaviors closely identified with obsessive-compulsive disorder (OCD). The focus is on thoughts, impulses, and actions experienced as unremitting and irresistable, but of an unwanted nature. This dimension also assesses more general cognitive difficulty, such as trouble remembering or mind going blank. Item contents are based on conventional symptoms reported by patients themselves over an extensive period of time (Derogatis et al., 1970). Items were then grouped by 20 qualified clinicians as well as being subjected to factor analysis. Construct validity was shown in a very high degree of equivalence between these clinical groupings and factor analysis of the dimensions (Derogatis et al., 1970). Rickels et al. (1972) also demonstrated construct validity; female neurotic patients were distinguished from female nonneurotic patients based on scores on the scale. Moreover, neurotic patients who had improved following drug treatment reported symptom distress levels that were not significantly different from those of the normal patients (Rickels et al., 1972). Concurrent validity was shown in high correlations between the SCL-90 and the BCI (Kaldestad, 1994) as well as between the SCL-90 and the MMPI (Derogatis, Rickels, & Rock, 1976). Derogatis et al. (1971) indicate a considerable degree of factorial invariance on the O-C subscale. A congruency coefficient of .86, .92, and .93 and a coefficient of invariance of .81, .92, and .88 was reported between psychiatrist's ratings and upper, middle, and lower class patient's self ratings on the SCL respectively (Derogatis et al., 1971). Finally, an internal consistency reliability of .86 has been reported for this subscale (Derogatis et al., 1976).

---

[1] Items composing obligatory and pathological factors of the CES are presented in Appendix E.

3.Perfectionism: The self-oriented perfectionism subscale of the Multidimensional Perfectionism Scale was used as a measure of self-directed perfectionistic behaviors (Hewitt & Flett, 1991). There are two other subscales included in this scale (other-oriented perfectionism and socially prescribed perfectionism). Each item consists of 15 items. The coefficient alphas (Cronbach, 1951) range from .79 to .89. The test-retest reliabilities were reported as .88 for self-oriented perfectionism, .85 for other-oriented perfectionism, and .75 for socially prescribed perfectionism (Hewitt & Flett, 1991). The content of the scales was derived from case descriptions as well as a theoretical review (Hewitt & Flett, 1991). Factor analysis of the instrument revealed that the three factors account for 33% of the variance in a university population and 34% in a psychiatric patient population (Hewitt & Flett, 1991). The factor structures obtained from the two samples were quite similar; coefficients of congruence were .94, .93, and .82 for self-oriented, other-oriented, and socially prescribed perfectionism respectively (Hewitt & Flett, 1991). Concurrent validity was shown in significant correlations between student ratings and MPS scores supplied by significant others (e.g., spouse), as well as between patient ratings and clinician MPS ratings (Hewitt & Flett, 1991). Significant correlations between self-oriented perfectionism and measures of high standards (.46, $p<.001$), self-criticism (.46, $p<.001$), and self-blame (.21, $p<.05$) indicate convergent validity while lack of correlations between this scale and demand for approval by others (-.03), fear of negative evaluation (.04), and other directed blame (.15) connotes discriminant validity. Correlations were also in the expected direction with other-oriented perfectionism and socially prescribed perfectionism. For example, other-oriented perfectionism was significantly correlated with other-blame (.43, $p<.001$), authoritarianism (.32, $p<.05$), and dominance (.30, $p<.05$), but not with demand for approval of others (.19), fear of negative evaluation (.17), and locus of control (.12). Socially prescribed perfectionism was positively associated with demand for approval of others (.27, $p<.01$), fear of negative evaluation (.46, $p<.001$), and locus of control (.20, $p<.05$), but not high self standards (.16), authoritarianism (.01), or dominance (-.21). Significant correlations between self-oriented perfectionism and guilt (.18, $p<.05$), and between socially prescribed perfectionism and anger (.44, $p<.01$) are evidence of the instrument's predictive validity (Hewitt & Flett, 1991).

4.Body Image: The Body Dissatisfaction Subscale (BDS) of the Eating Disorder Inventory (EDI) was used to measure satisfaction with the overall shape and size of the body. Internal consistency data for this subscale has been reported at .92 for both eating disordered populations (Garner & Olmsted, 1984), and non-eating-disordered populations alike (Raciti & Norcross, 1987). Test-retest reliability at one week (Welch, 1988), three weeks (Wear & Pratz, 1987), and one year (Crowther, Lilly, Crawford, Shepherd, & Oliver, 1990) has been established as .95, .97, and .75 respectively. Content validity was achieved through the generation of items and constructs by clinicians and theorists specializing in eating disorders (Garner, Olmsted, & Polivy, 1983). Criterion validity was established by Garner et al. (1983); eating disordered group samples were distinguishable from nonpatient female college groups based on subscale scores. A significant correlation (.44, p<.001) was obtained between patient self-report profiles on the BDS and clinicians' ratings of body dissatisfaction, indicating concurrent validity (Garner et al., 1983). The BDS is highly correlated with scores on the Body Shape Questionnaire in bulimia nervosa patients (.78, Cooper & Taylor, 1988) and restrained and unrestrained subjects (.82, Eldredge, Wilson, & Whaley, 1990). Further evidence for convergent validity is shown in high correlations between BDS and size estimation (.39, p<.001), body weight (.35, p<.001), and eating attitudes (.44, p<.001) (Garner, 1991). Welch, Hall, and Norring (1990) performed a factor analysis on the EDI responses of eating disordered patients and found that the pattern of factor loadings corresponded to the factors described by Garner et al. (1983). This finding has been duplicated in other studies involving nonpatient populations (Norring, 1989; Williams, Schaefer, Shisslak, Gronwaldt, & Comerci, 1986).

5.Self Esteem: The Rosenberg Self Esteem Scale (RSE) was used as a measure of global self esteem. This is one of the most widely used measures of self esteem (Robson, 1988).The test-retest reliability for the RSE is .85 (Silber & Tippett, 1965). The scale has been reported to have good reproducibility (92%) and good scalability (72%) (Rosenberg, 1965). Construct validity for this instrument has been established; self-esteem scores were found to be negatively and significantly related to feelings of unhappiness, gloom, and discouragement (Rosenberg, 1965). Also, there was a significant association between self esteem scores and the likelihood of appearing depressed to nurses (Rosenberg, 1965). Rosenberg (1965) also reported a "clear, though imperfect, relationship between self-esteem and psychosomatic symptoms of anxiety" (p. 25). Evidence of the scale's convergent validity has been demonstrated by Baker and Gallant (1985), who found strong correlations between scores on the RSE and scores on Miyamoto and Dornbusch's measure of self esteem (.56, $p<.05$). Similar findings are reported in a separate study, where RSE scores were significantly correlated with both peer ratings of self esteem (.32, $p<.05$) and scores on the Coopersmith Self-Esteem Inventory (.55, $p<.001$) (Demo, 1985). Baker and Gallant (1985) also provided evidence of it's predictive validity in that a negative and significant correlation was found between self-report measures of psychological stress and RSE scores (Baker & Gallant, 1985).

6.Physical Activity Index: One question listed various physical activities and participants were asked to indicate those in which they have participated over the last month (Canada Fitness Survey, 1982). Activities listed include exercise classes, walking, swimming, running, and others. For each activity, participants were required to indicate the frequency, intensity (light, medium, heavy), and duration in minutes (1-15, 15-30, 30-60, 60+). Physical activity was quantified by multiplying frequency x duration (1, 2, 3, 4 consecutively) x intensity (1, 2, 3 consecutively) for each activity, and summing across all activities checked. A similar procedure has been used in previous studies (Davis, Elliott, Dionne, & Mitchell, 1991; Davis, Fox, Cowles, Hastings, & Schwass, 1990) and was used to compile information on behaviors related to physical activity. Comparisons with studies using this method to quantify physical activity are made difficult by the fact that the actual variables included in the equation vary, as well as the numbers used to quantify intensity and duration. For example, some studies include frequency, intensity, and duration in the equation (Davis et al., 1990), while others use only frequency and duration (Davis & Cowles, 1991). Moreover, some studies quantify duration by multiplying each half hour by 1, 2, 3, 4 respectively (Davis & Fox, 1993), while others multiply duration by 1, 2, 4, 6 respectively (Davis et al., 1990).

7.Motivation to Exercise: The Lifestyle Questionnaire lists 10 reasons why people engage in physical activity (Canada Fitness Survey, 1982). Participants were asked to rate each reason as either very important, of some importance, of little importance, or of no importance. This method has been previously used as a simple measure of motivation to exercise (Davis & Cowles, 1991). For the purpose of this study, the question was modified somewhat. In it's original form, the question reads, "Here is a list of reasons why some people do physical activities during their leisure time. How important are each of these **to you?**". The question was altered to read, "Here is a list of reasons why some instructors teach aerobic fitness classes. How important are each of these **to you?**". Also, one more reason for teaching (To earn extra money) will be added to the list of items. The modified version of this question was distributed to several fitness instructors for feedback, which confirmed content validity.

3.5 Procedure.

To ensure randomness, systematic sampling was used (Glass & Hopkins, 1984). A random number between one and thirty was selected from a list of random numbers and every sixth person from this person received a questionnaire. This ensured that everyone on the list of 2100 aerobics instructors certified through the AFLCA had an equal opportunity of receiving a questionnaire. This orderly sampling method allows less opportunity for sampling error to occur than simple random samples (Glass & Hopkins, 1984). Confidentiality was assured in the cover letter attached to the questionnaire. Participants were asked to complete the entire questionnaire and send it back in a stamped, self-addressed envelope. A pre-survey contact message was included in the "Fitness Informer" prior to sending out the questionnaires (See Appendix A). The Fitness Informer is a quarterly newsletter sent out by the AFLCA office. Two weeks following questionnaire mail-out, the first follow-up letters were sent out thanking early responders and requesting non-responders to return the questionnaire.

CHAPTER 4

Results and Discussion

This chapter contains the results and interpretations of the findings pertaining to the research questions of this study. It is subdivided into 5 sections, namely: 1. Descriptive Statistics 2. Correlational Analysis of the Data 3. Prediction of CES by Stepwise Multiple Regression 4. Commitment to Exercise 5. Discussion.

4.1 Descriptive Statistics

4.1.1 Subjects

The method of sampling subjects was discussed in Section 3. 5. A total of three hundred questionnaires were sent out, 282 to females and 18 to males. However, the data reported are based on questionnaires received from female respondents only. Out of the 282 questionnaires sent to female aerobics instructors, 155 usable questionnaires were returned yielding a response rate of 55%.

The age of the subjects ranged from 20 years to 69 years, with a mean (M) age of 34.9 and a standard deviation (SD) of 9.36. This indicates a broad range of ages in this sample. The largest majority of the subjects had completed a University degree (40.6%) and currently work full-time (49.7%). Ninety-eight percent of respondents reported good to excellent health. Seventy-five percent reported being married or "common-law", 16% were never married, and 7.7% were separated or divorced. Only one subject reported being widowed. Sixty-six percent reported a household income of $40,000 or more. This information is presented in more detail in Tables 4.1 to 4.6.

4.1.2 Teaching Fitness Classes: Motivational Factors.

Eleven motivational factors for teaching aerobic fitness classes were listed on the questionnaire. Participants were asked to indicate how important each of the reasons were to them. Responses were scored from very important (1) to of no importance (4). This simple method was used to measure individuals' perceptions of motivating factors for exercise. The priorities for this sample of aerobics instructors, from most to least important, were: 1) to feel better mentally and physically, 2) for pleasure, fun, and excitement, 3) to move better or to improve flexibility, 4) to relax or reduce stress, 5) as a challenge to abilities, 6) to learn new things, 7) to control weight or to look better, 8) to be with other people, 9) to earn extra money, 10) because of fitness specialists' advice, 11) because of doctor's advice. Table 4.7 presents the mean scores for each motivational factor.

Table 4.1 EDUCATION LEVEL

	Frequency	Percent
High School Diploma	25	16.1
Some Postsecondary	31	20.0
University Degree	63	40.6
College Diploma	30	19.4
Graduate Degree	6	3.9

Table 4.2 EMPLOYMENT STATUS

	Frequency	Percent
Fulltime	77	49.7
Parttime	48	31.0
Home (unpaid)	15	9.7
Unemployed	2	1.2
Other	13	8.4

Table 4.3 AGE IN YEARS

	Frequency	Percent
20-29 years	45	29
30-39 years	75	48.4
40-49 years	23	14.9
50-59 years	7	4.5
60-69 years	5	3.2

Table 4.4 HEALTH STATUS

	Frequency	Percent
Poor	0	0
Fair	3	2.0
Good	63	40.6
Excellent	89	57.4

Table 4.5 INCOME LEVEL

	Frequency	Percent
Less than $20,000	13	8.4
$20,000-40,000	39	25.2
$40,000-60,000	50	32.3
$60,000+	53	34.2

Table 4.6 MARITAL STATUS

	Frequency	Percent
Never married	25	16.2
Married/common-law	117	75.5
Widowed	1	.6
Separated/divorced	12	7.7

Table 4.7 MEANS, STANDARD DEVIATIONS, MINIMUM, AND MAXIMUM SCORES ON MOTIVATION FOR TEACHING AEROBIC FITNESS CLASSES*

	Mean	SD	Minimum	Maximum
Feel better mentally and physically	1.226	.529	1.00	4.00
Be with other people	1.884	.764	1.00	4.00
Pleasure, fun, or excitement	1.355	.567	1.00	3.00
Control weight or look better	1.826	.807	1.00	4.00
Move better or improve flexibility	1.677	.837	1.00	4.00
Challenge to abilities	1.774	.842	1.00	4.00
Relax or reduce stress	1.684	.903	1.00	4.00
Earn extra money	2.477	1.01	1.00	4.00
Learn new things	1.781	.750	1.00	4.00
Fitness specialist's advice	2.779	1.14	1.00	4.00
Doctor's advice	3.555	.807	1.00	4.00

*1= Very important
2= Of some importance
3= Of little importance
4= Of no importance

Eighty-one percent of participants in this study stated that teaching was very important to them because it helps them feel better mentally and physically, and 69% because it is pleasurable, fun, or exciting. To move better/improve flexibility and to relax/ reduce stress was seen as very important by 53% and 56% respectively. Being with other people was a very important reason behind teaching aerobic classes for a minority of the sample (34%), while 31% stated that it was of little or no importance. Thirty-eight percent stated that teaching to control weight/look better was very important, while an additional 46% said it was of some importance. To learn new things was very important and of some importance to 39% and 47% respectively. Only 20% of respondents said that earning extra money was an important reason behind teaching fitness classes, while 50% felt money was of little or no importance. Thirty-eight percent and 72% stated that teaching classes because of fitness specialist's or doctor's advice respectively was of no importance. Table 4.8 summarizes the frequency data for subjects' responses on the four-point motivational scale. The significance of these findings will be discussed in further detail in Section 4.5.1 and 4.5.4.

Table 4.8 FREQUENCY OF RESPONSES ON MOTIVATION FOR TEACHING AEROBIC FITNESS CLASSES (PERCENT IN BRACKETS)

	N	Very Important	Of Some Importance	Of Little Importance	Of No Importance
Feel better mentally and physically	155	126 (81%)	25 (16%)	2 (1%)	2 (1%)
Be with others	155	52 (34)	72 (47)	28 (18)	3 (2%)
Pleasure, fun, excitement	155	107 (69)	41 (27)	7 (5)	0 (0)
Control weight or look better	155	59 (38)	71 (46)	18 (12)	7 (5)
Move better or improve flexibility	155	82 (53)	46 (30)	22 (14)	5 (3)
Challenge to abilities	155	69 (45)	59 (38)	20 (13)	7 (5)
Relax or reduce stress	155	86 (56)	41 (27)	19 (12)	9 (6)
Earn extra money	155	31 (20)	47 (30)	49 (32)	28 (18)
Learn new things	155	60 (39)	73 (47)	18 (12)	4 (3)
Fitness specialist's advice	154	27 (17)	39 (25)	29 (19)	59 (38)
Doctor's advice	155	6 (4)	13 (8)	25 (16)	111 (72)

4.1.3 Physical Activity Level.

Physical activity was measured by the Lifestyle Questionnaire (Canada Fitness Survey, 1982) and quantified by multiplying frequency x duration x intensity for each activity, and summing across all activities checked. Descriptive statistics found are as follows: M=238.5, SD=135.68, Md=218. As mentioned in Section 3.4, it is difficult to compare these results to previous research because of the inconsistencies in how physical activity has been quantified (See Table 4.9). For example, Davis and Cowles (1991) found a mean physical activity score of 167.00 (SD= 115.71) in a group of exercising women 25 years of age or younger, and a mean score of 102.06 (SD = 89.32) in the same study with active women 25+ years. However, intensity of exercise was not included in the quantification of physical activity (Davis & Cowles, 1991). In another study by the same researchers that did include exercise intensity, mean scores on physical activity for exercise/diet group and for exercise/rarely diet group were 381.36 (SD=291.03) and 213.79 (SD=180.44) respectively (Davis et al., 1990). However, Davis et al. (1990) quantified exercise duration (1-15, 15-30, 30-60, 60+) by multiplying by 1, 2, 4, and 6 respectively, while other studies have multiplied the same units by 1, 2, 3, and 4 respectively (Davis et al., 1995). Therefore, how the present results compare to other exercising populations is difficult to determine.

Table 4.9 PHYSICAL ACTIVITY SCORES AND VARIABLES ACROSS STUDIES

Study	PA Variables	Sample	Mean	SD	Minimum	Maximim
Davis et al. (1990)	F x D x I	female exercisers dieters	381.36	291.03	7	1344.00
Davis et al. (1990)	F x D x I	female exercisers nondieters	213.79	180.44	8	730.00
Davis & Cowles (1991)	F x D	female exercisers <25 yrs of age	167.00	115.71	8	608.00
Davis & Cowles (1991)	F x D	female exercisers >25 yrs of age	102.06	89.32	3	356.00
Davis et al. (1993)	W x F^ x D*	female exercisers	1038.66	631.11	24.00	3886.00
Davis et al. (1995)	W x F^ x D**	moderate exercisers	600.25	18.49	190.44	1095.61
Davis et al. (1995)	W x F^ x D**	high-level exercisers (S2)	1536.64	22.09	1122.25	2530.09
Davis et al. (1995)	W x F^ x D**	high-level exercisers (S3)	1069.29	88.36	432.64	3226.24
Current study	F xD** x I	female aerobics instructors	238.51	135.69	8.00	672.00

D Duration = (1-15, 15-30, 30-60, 60+) x (1, 2, 4, 6)
D* Duration = (1-30, 30-60, 60-90, 90-120, 120+) x (1, 2, 3, 4, 5)
D**Duration = (1-30, 31-60, 61-90, 90+) x (1, 2, 3, 4)
F Frequency = Number of times engaged in activity over last month
F^ Frequency = Average number of sessions per week
I Intensity = (light, medium, heavy) x (1, 2, 3)
W = Number of weeks of participation over last year

4.1.4 Commitment to Exercise.

Table 4.10 presents group means, standard deviations, minimum and maximum values, and ranges for age, physical activity, and all psychological variables.

Responses to the eight questions on the Commitment to Exercise Scale (CES) were scored 1 to 15. The total scores on the CES ranged from 24.55 to 107.15, with the highest possible score being 120. The distribution of CES scores is shown in Fig.1. The mean score was 59.95, with a standard deviation of 15.77 (Md=59.30)[2].

4.1.5 Descriptive Data on Psychological Scales.

This information includes all subjects and is reported in summary in Table 4.10.

1. Compulsivity. Responses on the obsessive-compulsive (O-C) subscale of the SCL-90 were scored 0 to 4, higher scores indicating greater obsessive-compulsive tendency. The highest possible score was 40. The scores for this sample ranged from 0 to 25 with a M = 11.1 and SD = 5.42 (Md=10.50).

2. Perfectionism. The responses to the items on the self-oriented perfectionism subscale of the Multidimensional Perfectionism Scale were scored from strongly agree to strongly disagree. The scores ranged from 24 to 105 with 105 being the highest possible score. Scores on this measure were high as indicated by M= 70.20 and Md=70.50 (SD= 14.84).

3. Self Esteem. All items on Rosenberg's Self Esteem Scale were scored from 0 to 4, with half of the items being reversed scored. The scores ranged from 17 to 40 (highest possible

---

[2] Descriptive statistics on individual questions of the CES are available in Appendix F

Table 4.10 MEANS, STANDARD DEVIATIONS, MINIMA, MAXIMA, AND RANGES FOR AGE, PHYSICAL ACTIVITY, AND ALL PSYCHOLOGICAL VARIABLES

	Minimum	Maximum	Range	Mean	SD
Age	20	69	29	34.89	9.36
PA	8	672	662	238.51	135.69
CES	24.55	107.15	82.6	59.95	15.77
RSE	17	40	23	30.87	5.47
BDS	0	27	27	7.14	6.30
O-C	0	25	25	11.10	5.42
PER	24	105	81	70.20	14.84

AGE: Age in years
PA: Level of physical activity - Lifestyle Questionnaire (Canada Fitness Survey)
CES: Commitment to Exercise
RSE: Rosenberg's Self Esteem Scale
BDS: Body Dissatisfaction Subscale of the Eating Disorder Inventory
O-C: Obsessive-Compulsive subscale of the SCL-90
PER: Self-Oriented Perfectionism subscale of the Multidimentional Perfectionism Scale

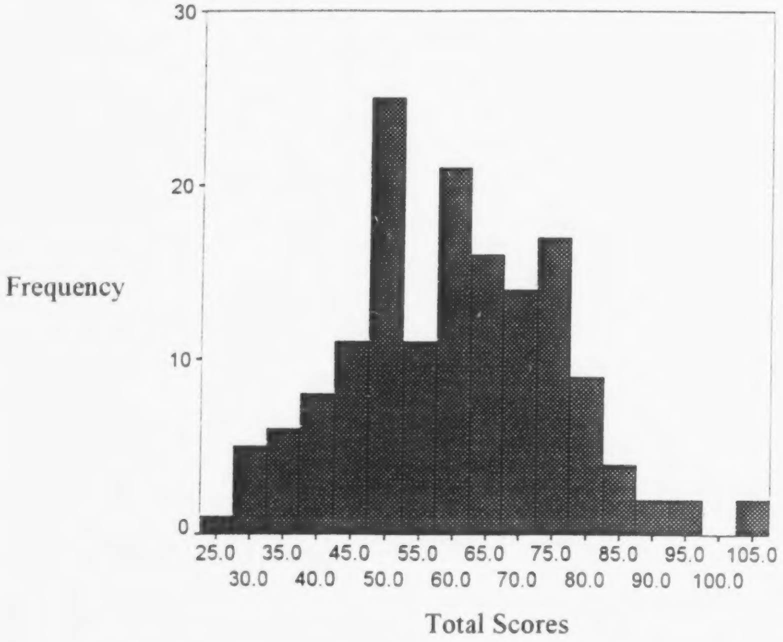

Fig. 1. Histogram for total scores on Commitment to Exercise Scale.

score = 40) with M = 30.87, Md = 30.50, and SD = 5.47.

4. Body Image. Responses on the Body Dissatisfaction Subscale (BDS) of the Eating Disorder Inventory (EDI) were scored from 0 to 3, with five of the nine items reverse scored and the highest possible score being 27. The mean score was 7.14 with a standard deviation of 6.30 and median score of 5.38. Since the mean is the larger value of these two measures of central tendency, this indicates that the distribution is positively skewed (Glass & Hopkins, 1984).

4.2 Correlational Analysis of the Data

4.2.1 Exercise Dependence and Psychological Characteristics

The literature review suggested that exercise dependence would be associated with a greater prevalence of certain psychological characteristics. The following data will be presented according to the research questions posed regarding exercise dependence and self esteem, body image, compulsivity, and perfectionism. Table 4.11 presents the results of pairwise correlation coefficients among the following variables: exercise dependence, physical activity, self esteem, body image, compulsivity, and perfectionism (See Appendix G for complete correlation matrix).

1. Do aerobics instructors scoring higher on the CES also score higher on measures of compulsivity?

A modest, but significant ($r=.197$, $p<.05$) correlation was found between compulsivity and exercise dependence. Higher scores on compulsivity, then, were associated with higher CES scores.

Table 4.11 PEARSON CORRELATION COEFFICIENTS - CES, PA, AND SELECTED PSYCHOLOGICAL VARIABLES[2]

	CES	PA
RSE	-.2002*	.1518
BDS	.2280*	-.0970
O-C	.1966*	-.1698*
PER	.3144***	.2243**
PA	.2090*	1.000

*$p<0.05$
**$p<.01$
***$p<.001$

PA: Level of physical activity - Lifestyle Questionnaire (Canada Fitness Survey)
CES: Commitment to Exercise
RSE: Rosenberg's Self Esteem Scale
BDS: Body Dissatisfaction Subscale of the Eating Disorder Inventory
O-C: Obsessive-Compulsive subscale of the SCL-90
PER: Self-Oriented Perfectionism subscale of the Multidimentional Perfectionism Scale

---

[2] Correlations are presented in Appendix H, separating out pathological and obligatory factors of the CES.

2. Do aerobics instructors scoring higher on the CES also score higher on measures of perfectionism?

A positive correlation of .314 was found between perfectionism and exercise dependence, which is significant at $p<.001$. This means that high scores on perfectionism were associated with high scores on CES.

3. Do aerobics instructors scoring higher on the CES score lower on a measure of self esteem?

A modest (-.20), but significant negative ($p<.05$) correlation was found between exercise dependence and self esteem, indicating that aerobics instructors who score higher on exercise dependence tend to have lower self esteem.

4. Do aerobics instructors scoring higher on the CES also score higher on a measure of body dissatisfaction?

A positive correlation was found between body dissatisfaction and exercise dependence (.228, $p<.01$). Therefore, findings suggest those aerobics instructors that score higher on exercise dependence also tend to be less satisfied with the shape and size of their bodies, although the association is modest.

4.2.2 Psychological Characteristics and Motivational Factors

Correlations between psychological characteristics and motivational factors are presented in Table 4.12. CES scores were positively correlated with teaching to control weight or look better ($r=.307$, $p<.01$), and with teaching because of a fitness specialist's advice ($r=.274$, $p<.01$). CES scores were also positively correlated with importance placed upon teaching as a challenge to abilities ($r=.213$, $p<.01$) and as an

Table 4.12 PEARSON CORRELATION COEFFICIENTS - MOTIVATIONS TO TEACH AND SELECTED PSYCHOLOGICAL VARIABLES[4]

	CES	PA	RSE	BDS	PER	O-C
feel better mentally and physically	.099	-.170*	-.062	.043	-.039	.149
be with other people	.134	.023	-.037	-1.08	-.072	.105
pleasure, fun, or excitment	.056	-.049	.054	.030	-.015	-.024
control weight or look better	.307**	-.104	-.161*	.335**	-.010	.258**
move better or improve flexibility	.148	-.134	-.110	.100	-.070	.199*
challenge to abilities	.213**	.018	.066	.058	.244**	.063
relax or reduce stress	.124	-.240**	-.056	.145	-.022	.113
earn extra money	.015	.095	.005	.078	.129	-.025
learn new things	.227**	-.001	-.014	-.010	.078	.075
fitness specialist's advice	.274**	.014	-.130	.021	.059	.074
doctor's advice	.138	-.066	-.127	-.040	.013	.102

*$p<0.05$
**$p<.01$

Negatively scored scales have been reverse scored in Table 4.7 to simplify interpretation of correlations.

opportunity to learn new things (r=.227, p<.01). Therefore, those who scored higher on Commitment to Exercise also tended to see teaching as important to control weight/look better, and as a challenge and a learning experience. Physical activity scores were positively correlated with two motivational factors; teaching as important to feel better mentally and physically (r=.170, p<.05), and teaching as important to relax or reduce stress (r=.240, p<.01). Therefore, the more physically active the individual, the more likely she was to see teaching as important to feel better and to help reduce stress.

Compulsivity scores were significantly correlated with teaching to control weight or look better (r=.258, p<.01), and teaching to move better or improve flexibility (r=.199, p<.05). Alternatively, a significant negative correlation (-.17, p<.05) was found between compulsivity and level of physical activity. This variable was also negatively correlated with self esteem scores (r= -.320, p<.01) and positively correlated with body dissatisfaction scores (r=.176, p<.05) (See Table 4.13). Therefore, greater levels of compulsivity were associated with a lower self esteem and greater body dissatisfaction.

Perfectionism was significantly correlated with physical activity (r=.224, p<.01) and teaching because it is a challenge to abilities (r=.244, p<.01). Therefore, individuals who scored higher on perfectionism also tended to be more physically active and see teaching as important as a challenge to abilities.

Self esteem was significantly and negatively correlated with teaching to control weight or to look better (r=-.161, p<.05), suggesting that as self esteem increases, individuals are less likely to see teaching aerobics as important to control weight or to look better. Body dissatisfaction was also significantly correlated with motivation to teach

Table 4.13 PEARSON CORRELATION COEFFICIENTS - SELECTED PSYCHOLOGICAL VARIABLES

	RSE	**BDS**	**O-C**	**PER**
RSE	1.000	-	-	-
BDS	-.2785***	1.000	-	-
O-C	-.3199***	.1758*	1.000	-
PER	.0537	.1198	.1459	1.000

*$p<0.05$
**$p<.01$
***$p<.001$

to control weight or to look better (r= .335, p<.01). For individuals with higher scores on body dissatisfaction, teaching aerobics was more important for controlling weight or looking better than for those with lower scores on body dissatisfaction.

4.3 Prediction of CES by Stepwise Multiple Regression

A stepwise regression procedure was conducted to examine the relative contributions of each psychological variable to CES. The independent variables used were scores on Rosenberg's Self Esteem Scale (RSE), the obsessive-compulsive (O-C) subscale of the SCL-90 , self-oriented perfectionism subscale of the Multidimensional Perfectionism Scale (PER), the Body Dissatisfaction Subscale (BDS) of the Eating Disorder Inventory (EDI), and level of physical activity (PA) as measured by the Lifestyle Questionnaire.

The regression analysis revealed that three of the psychological variables and physical activity entered the equation for predicting CES (See Table 4.14). In order of entry into the equation, variables were: perfectionism (R_2=.097, s.e.=15.3952, b=.335), self esteem (R_2=.139, s.e.=15.0784, b=-.599), physical activity (R_2=.170, s.e.=14.8638, b=.021), and body dissatisfaction (R_2=.196, s.e.=14.6842, b=.432). The significant F ratio indicates that the psychological variables in combination were significantly related to CES.

The results of the regression analysis indicated that perfectionism, self esteem, physical activity, and body dissatisfaction together could account for 19.6% of the variance in CES. Compulsivity did not enter into the equation which shows that it

Table 4.14 STEPWISE MULTIPLE REGRESSION: MODEL SUMMARY OF PREDICTOR VARIABLES ON CES

Variable	Multiple R	R2	Adjusted R2	SE
PER	.311	.097	.090	15.395
RSE	.373	.139	.127	15.078
PA	.412	.170	.152	14.864
BDS	.442	.196	.172	14.684

contributed no relevant or unique variance to the set of predictor variables.

4.4 High CES Scores: Motivational and Psychological Profiles.

A high score on exercise dependence was arbitrarily defined as those scores which fell one standard deviation above the mean (75.75+). By this definition, fifteen percent of the instructors in this sample, or 25 of 155 instructors, scored high on dependence on exercise. The motivational, psychological, and CES scores of these 25 instructors (Group A) were isolated and descriptive statistics analyzed for three reasons. First, to explore whether different motives for teaching aerobics could be seen from a visual inspection of the means and distribution of responses between the two groups. Second, to determine if this sub-set of aerobics instructors tended to have a distinctive profile on those characteristics suggested by previous authors to be symptomatic of exercise dependence. Third, descriptive data from the psychological scales were inspected for indications that Group A was more likely to fit Zaitz's (1989) description of instructors who are dependent on exercise than those who did not score one standard deviation above the mean (Group B). In other words, these individuals were separated from the rest of the sample in order to determine if they were more likely to be physically active, perfectionistic, compulsive, and low in self esteem and body image than the rest of the sample.

Tables 4.15 and 4.16 display the descriptive statistics on motivational factors behind teaching for Group A and Group B. Thirty-five percent of the instructors in Group B find being with other people to be a very important reason behind teaching aerobics, compared to 24% of those in Group A. Also, more individuals in Group B saw teaching as

Table 4.15 DESCRIPTIVE STATISTICS ON FREQUENCY OF RESPONSES ON MOTIVATION FOR TEACHING AEROBIC FITNESS CLASSES FOR SUBJECTS SCORING 1 SD ABOVE THE MEAN OR HIGHER ON CES (GROUP A) (PERCENT IN BRACKETS)

	Mean	SD	Very Important	Of Some Importance	Of Little Importance	Of No Importance
feel better mentally and physically	1.20	.408	20(80)	5(20)	0(0)	0(0)
be with other people	1.92	.640	6(24)	15(60)	4(16)	0(0)
pleasure, fun, and excitement	1.40	.577	16(64)	8(32)	1(4)	0(0)
control weight or look better	1.44	.501	14(56)	11(44)	0(0)	0(0)
move better or improve flexibility	1.52	.714	15(60)	7(28)	3(12)	0(0)
challenge to abilities	1.64	.700	12(48)	10(40)	3(12)	0(0)
relax or reduce stress	1.48	.714	16(64)	6(24)	3(12)	0(0)
earn extra money	2.56	.917	2(8)	9(36)	10(40)	4(16)
learn new things	1.60	.577	11(44)	13(52)	1(4)	0(0)
fitness specialist's advice	2.40	1.12	6(24)	9(36)	4(16)	6(24)
doctor's advice	3.44	.917	2(8)	1(4)	6(24)	16(64)

Table 4.16 DESCRIPTIVE STATISTICS ON FREQUENCY OF RESPONSES ON MOTIVATION FOR TEACHING AEROBIC FITNESS CLASSES FOR SUBJECTS NOT SCORING AT LEAST 1 SD ABOVE THE MEAN OR HIGHER ON CES (GROUP B) (PERCENT IN BRACKETS)

	Mean	SD	Very Important	Of Some Importance	Of Little Importance	Of No Importance
feel better mentally and physically	1.23	.550	105(81)	21(16)	2(1.5)	2(1.5)
be with other people	1.88	.788	46(35)	57(44)	24(18)	3(3)
pleasure, fun, and excitement	1.35	.567	91(70)	33(25)	6(5)	0(0)
control weight or look better	1.90	.834	44(34)	61(47)	18(14)	7(5)
move better or improve flexibility	1.71	.856	66(51)	40(30)	19(15)	5(4)
challenge to abilities	1.80	.866	56(43)	50(38)	17(13)	7(6)
relax or reduce stress	1.72	.932	70(54)	35(27)	17(13)	9(6)
earn extra money	2.46	1.03	27(21)	39(30)	40(31)	24(18)
learn new things	1.82	.775	49(38)	60(46)	17(13)	4(3)
fitness specialist's advice	2.85	1.13	21(16)	30(23)	26(20)	53(41)
doctor's advice	3.58	.786	4(3)	13(10)	18(14)	95(73)

very important to earn extra money (21%) than individuals in Group A (8%). Alternatively, more individuals in Group A found teaching to control weight or look better (56%), and teaching to relax or reduce stress (64%) as very important than Group B instructors (34% and 54% respectively).

Tables 4.17 and 4.18 present the descriptive statistics on individual items of the CES for Group A and Group B. This information is presented as some of these items have been identified by previous researchers to be particularly relevant to exercise dependence (Chan, 1986; Morgan, 1979; Veale, 1987). It should be recognized, however, that these items are each components of the overall CES scale and thus they contributed to the establishment of the two comparison groups. When asked if they get upset when unable to exercise, the mean score for Group A was 12.10, while the mean score was 8.48 for Group B. There was also a large difference on mean scores for CES5 and CES6, which asked if they continue to exercise when feeling tired or unwell and when suffering an exercise-related injury respectively. Mean score for Group A was 11.52 and 7.78, while that of Group B was 6.36 and 4.44 respectively. Mean score for CES7 (feeling guilty when unable to exercise) was 11.39 for Group A and 6.27 for Group B, and mean score for CES8 (times when turn down an invitation to an interesting social event that interferes with exercise schedule) was 8.45 for Group A and 4.7 for Group B.

Mean differences between the two groups on the psychological scales were also compared. Of the 25 instructors in Group A, 40% scored below average on self esteem. In comparison, 12% of the instructors in Group B scored below average on self esteem. Fourty-eight percent

Table 4.17 DESCRIPTIVE STATISTICS ON COMMITMENT TO EXERCISE FOR SUBJECTS SCORING 1 SD ABOVE THE MEAN OR HIGHER ON CES (GROUP A)

	N (out of 25)	% of sub-sample	Min	Max	Mean	SD
CES1	20	80	10.65	14.8	12.98	1.26
CES2	24	96	8.35	15.0	12.10	1.40
CES3	19	76	2.65	14.8	8.96	3.22
CES4	19	76	2.2	14.5	10.56	3.36
CES5	25	100	9.3	14.85	11.52	1.45
CES6	18	72	1.5	14.9	7.78	3.76
CES7	24	96	6.95	14.9	11.39	2.12
CES8	22	88	.60	14.95	8.45	3.15

Table 4.18 DESCRIPTIVE STATISTICS ON COMMITMENT TO EXERCISE FOR SUBJECTS NOT SCORING AT LEAST 1 SD ABOVE THE MEAN ON CES (GROUP B)

	N (out of 130)	% of sub-sample	Min	Max	Mean	SD
CES1	67	52	2.5	14.7	11.41	2.04
CES2	59	46	1.8	14.5	8.48	2.81
CES3	53	41	.55	12.7	6.22	3.32
CES4	68	53	.50	14.15	8.04	3.68
CES5	57	44	.50	14.1	6.36	3.32
CES6	43	33	.55	12.5	4.44	2.99
CES7	56	43	.20	14.0	6.27	3.55
CES8	39	30	.40	12.8	4.1	3.14

of Group A instructors scored above average on level of physical activity compared to 42% of Group B. Furthermore, 52% of Group A instructors scored above average on compulsivity and 64 % above average on perfectionism. Fourty-five percent and 47 % of Group B instructors scored above average on the same scales respectively. Finally, 60% of Group A scored above average on body dissatisfaction compared to 39% of Group B. Tables 4.19 and 4.20 present this information in summary form.

Tables 4.19 and 4.20 also display the means on each of these variables between the two groups. Visual inspection suggests that there appears to be some differences between the two groups, for example, on level of physical activity, body dissatisfaction, and perfectionism, but not self esteem and compulsivity.

4.5 Discussion

4.5.1 Teaching Fitness Classes: Motivations

There are several reasons that aerobics instructors teach fitness classes, only some of which were listed on the questionnaire. Others that were listed by the instructors themselves were: to impart information to participants and help them reach realistic goals, to teach others how to make fitness fun, to help others feel better about themselves, to give others an activity which keeps them moving and improves their well-being, to be the center of attention, and for the love of teaching.

Table 4.19 DESCRIPTIVE STATISTICS ON PSYCHOLOGICAL SCALES AND PHYSICAL ACTIVITY FOR SUBJECTS SCORING 1 SD ABOVE THE MEAN OR HIGHER ON CES (GROUP A)

	N (out of 25)	% of sub-sample	Min	Max	Mean	SD
PA	12	48	76	600.5	283.72	138.15
RSE	10	40	17	38.00	29.44	5.16
BDS	15	60	0.00	22.00	10.00	7.29
O-C	13	52	2.00	20.00	11.24	5.04
PER	16	64	55.00	99.00	76.04	12.14

TABLE 4.20 DESCRIPTIVE STATISTICS ON PSYCHOLOGICAL SCALES AND PHYSICAL ACTIVITY FOR SUBJECTS WHO DID NOT SCORE AT LEAST 1 SD ABOVE THE MEAN ON CES (GROUP B)

	N (out of 130)	% of sub-sample	Min	Max	Mean	SD
PA	54	42	8.00	672.00	229.92	134.07
RSE	16	12	18.00	40.00	31.15	5.50
BDS	51	39	0.00	27.00	6.58	5.97
O-C	58	45	0.00	25.00	11.07	5.51
PER	61	47	24.00	105.00	69.11	15.09

From those motivational factors listed on the questionnaire, several interesting findings are worthy of noting. The most important reason why this sample of instructors teach aerobic fitness classes is to feel better mentally and physically. The fact that pleasure, fun, and excitement was the second most important reason for teaching aerobic fitness classes is also interesting. In her case studies on aerobics instructors who became exercise dependent, Zaitz (1989) describes how exercise was no longer a source of fun, but rather something that they "must do". This did not appear to be the case for the majority of instructors in this sample. Two other reasons seen as very important by over half of the sample were to relax or reduce stress, and to move better or improve flexibility. The fact that 56% of respondents stated that teaching aerobics to relax or reduce stress was very important, while an additional 27% said that it was of some importance lends some support to the notion that exercise may act as an escape activity from life's stressors for some individuals (Sachs, 1987). Furthermore, it has been suggested that stress may increase susceptibility to the development of a dependency (Peele & Brodsky, 1991). Perhaps it would be useful to teach aerobics instructors alternative stress management techniques and problem-solving skills so that exercise does not become the only means by which to cope. As Benyo (1990) states, "Endurance exercise should be a *tool* for solving problems, not the supposed solution to those problems" (p.114).

Some other findings are interesting. Only a minority of the sample saw being with other people as an important reason behind teaching aerobics classes. Therefore, many instructors in this sample do not teach aerobics for social reasons. For the most part, these instructors also do not teach for monetary reasons. Only 20% of respondents said that earning extra money is an important reason behind teaching fitness classes. Subjects were also not prompted to exercise in order to improve health or fitness, as 38% and 72% stated that teaching classes because of fitness specialist's or doctor's advice respectively was of no importance.

4.5.2 Descriptive Data: Psychological Scales

In general, scores on the compulsivity and perfectionism scales were in the expected directions. The scores on the obsessive-compulsive subscale for this sample ranged from 0 to 25 with M = 11.1 and SD = 5.42. This is somewhat higher than scores found with other female nonpatient populations (M = 9.6, SD = 6.5, Derogatis et al., 1973). The scores on the self-oriented perfectionism subscale were also somewhat higher than those received in previous research (Hewitt and Flett, 1991), ranging from 24 to 105 with M= 70.20 and SD= 14.84 (Md=70.50). Hewitt and Flett (1993) report on several consecutive studies completed on nonpatient populations which found mean scores of 65.27, 68.00, 64.65, 66.72, 65.87, and 73.42.

Generally speaking, in terms of self esteem and body image, findings were favorable. The scores on Rosenberg's Self Esteem Scale ranged from 17 to 40 with M = 30.87 and SD = 5.47, indicating that the self esteem scores for this group of aerobics instructors were generally quite high and comparable to those received in previous studies (M = 30.63, SD = 4.12; Baker and Gallant, 1985). The scores on the Body Dissatisfaction Subscale were somewhat lower than those found in previous studies (M= 7.14, SD=6.30). Garner and Olmsted (1984) found a mean score of 9.7 on body dissatisfaction in a sample of nonpatient females, while Toner, Garfinkel, and Garner (1987) found a mean of 7.7 in a similar group of females. This suggests that the current sample were somewhat more satisfied with the shape and size of their bodies than has been found in females of similar age groups.

4.5.3 Correlation and Prediction of CES Using Selected Psychological Variables

The main purpose of the study was to examine relationships among certain personality characteristics and dependence on exercise in aerobics instructors. Pearson's product moment correlations indicated a significant but modest relationship between exercise dependence and each of the following variables: perfectionism, compulsivity, self esteem, body image, and physical activity. Correlations compare favorably with that found in similar studies.

There is some tendency for those aerobics instructors who score higher on the CES to score higher on a measure of compulsivity than those instructors with lower scores on the CES. The correlation between compulsivity and exercise dependence is modest, but not entirely surprising as research has typically found no relationship between compulsivity and exercise dependence in women, although findings have been different with men (Chapman and DeCastro, 1990; Davis et al., 1993; Kagan and Squires, 1985). The negative correlation found between compulsivity and level of physical activity is similar to studies done by Chapman and DeCastro (1990), who found a significant negative correlation between exercise duration and compulsivity, and Kagan and Squires (1985) who found a significant negative correlation between compulsivity and times per week, hours per week, and miles per week. These findings, however, are in contrast with others which have found a positive correlation between these two variables (Davis et al., 1995; Goldfarb and Plante, 1984; Kagan, 1987). The differences between the studies can be explained by the quantitative measures used. Kagan (1987) used two scales to measure compulsiveness: Order and Regularity, and Detail and Perfectionism. A more appropriate comparison with the present study, then, would be with the Self-Oriented Perfectionism subscale, which did have a positive correlation with frequency of physical activity ($r=.22$, $p<.01$). Similarily, Golfarb and Plante (1984) used the Activity Vector Analysis (AVA) to measure personality characteristics such as assertiveness, obsessiveness, perfectionism, and anxiety, and found that frequency of physical activity was positively associated with these characteristics. Therefore, results are in agreement with previous research. In sum, high scores on compulsivity were associated with lower scores on physical activity but higher scores on exercise dependence. This means that the more physical activity the instructor engaged in, the less likely she was to reflect a compulsive profile. On the other hand, the more the exercise took on a pathological and obligatory nature, the more likely the instructor was to be compulsive.

The strongest correlation found was that between exercise dependence and perfectionism ($r=.314$, $p<.001$). Those aerobics instructors who scored higher on the CES also scored higher on perfectionism. Moreover, individuals who were more perfectionistic also tended to see teaching as more important as a challenge to their abilities ($r= -.244$, $p<.01$). There is very little research with which to compare these findings to, as previous studies are either of a clinical nature (Clark, 1991; De la Torre, 1995, Zaitz, 1989), or have not presented a correlation coefficient between a measure of exercise dependence and perfectionism (Kagan & Squires, 1985; Krejci et al., 1992). The finding does suggest, however, that those who are more dependent on exercise also tend to be more perfectionistic, and supports Chan's (1986) statement that aerobic exercise often develops into obsessions among individuals who demand high standards and achievements for themselves.

It was found that those aerobics instructors who score higher on the CES also tend to score lower on a measure of self esteem. The modest but significant negative correlation ($r=-.20$, $p<.05$) was found between exercise dependence and self esteem. This is consistent with previous findings. For example, Estok and Rudy (1986) reported that more "high addiction" runners scored significantly lower in self esteem (chi square=11.48, $p<.001$) than did low addiction runners. The same researchers (Rudy and Estok,1989) studied a similar sample of runners and reported a Pearson's correlation coefficient of -.23 ($p<.003$) between 'addiction' scores (as measured by the Running Addiction Scale) and self esteem (as measured by Rosenberg's Self-Esteem Scale).

Aerobics instructors who scored higher on the CES also tended to score higher on body dissatisfaction (BDS) ($r=.23$, $p<.01$). In other words, those aerobics instructors that are more dependent on exercise are more dissatisfied with the shape of their bodies, although the association is modest. This finding is similar to that reported by Davis et al. (1993; 1995). In one study, it was found that weight preoccupation was related to both factors of the CES (obligatory and pathological) in a group of exercising men and women (Davis et al., 1993), while in a second study, weight preoccupation was found to be significantly related only to the obligatory factor of the CES (Davis et al., 1995). In the current study, BDS was also significantly correlated with motivation to teach to control weight or look better (r=.335, p<.010), but was not related to level of physical activity. This is comparable to findings reported by Davis and Cowles (1991), who also found that degree of exercise participation did not relate to any of the body image variables (body dissatisfaction, desired weight) in women. The positive correlation between BDS and motivation to teach to control weight/look better suggests that for individuals who were more dissatisfied with the shape of their bodies, teaching aerobics was more important for controlling weight or looking better than for those more satisfied with the shape and size of their bodies.

The correlations reported here were significant (p<.05), but modest. The findings may have reached significance partly because of the large sample size in this study (N=155), as the value of r is influenced by the sample size (Glass and Hopkins, 1984). Therefore, although there were some very interesting similarities in the responses received from this sample of aerobics instructors, there were just as many differences. This is not unlike what was found by Sachs and Pargman (1979), who stated that "although it is possible to produce a general psychological description of the 'exercise addict', considerable variability exists in individual attributes which tends to preclude sweeping characterizations" (p.148).

Multiple regression analyses indicated that perfectionism, self esteem, body image, and physical activity were significant predictors of exercise dependence. To the author's knowledge, no multiple regression analyses have been conducted using the psychological data measured in this study as predictors of exercise dependence. Therefore, comparisons with similar studies can not made. However, findings can be discussed in terms of a review of the literature.

Perfectionism as the first predictor variable was somewhat surprising. Perhaps it emerged at this level of significance because perfectionism, as a personality trait, involves striving to attain the highest degree of excellence in all endeavors, including one's workouts and body appearance (Hewitt & Flett, 1991; Ingram, 1982). Physical activity, the third predictor variable, is not surprising since Carmack and Martens (1979) similarly found that length of run was a significant predictor of Commitment to Running.

Closely linked to one's perfectionistic strivings are constant feelings of self-doubt and a lack of self-worth. The emergence of self esteem and body image as predictor variables of CES, then, is not surprising. The close relationship between self esteem and body image has been previously discussed (See Section 1.1), it will simply be recalled here that self esteem involves the appraisal of one's own worth, significance, attractiveness, competence, and ability to satisfy personal aspirations (Robson, 1988). Individuals may depend on exercise, then, to enhance self esteem via greater body satisfaction. Similarly, exercise dependence and perfectionism may be strongly linked because the individual depends on exercise to attain her/his high standards. Giving into fatigue or illness is evidence that the person is not good, or at least not good enough, and therefore the person feels guilty and upset when exercise sessions are missed. Eventually, the person learns that the only way to avoid certain negative mood states is to 'do better'. 'Doing better' involves exercising daily, not missing an exercise session, and following a set program as closely as possible (Kline, Franken, and Rowland, 1994). In sum, perfectionism, self esteem, physical activity, and body dissatisfaction were found to be significant predictors of exercise dependence (measured by the Commitment to Exercise Scale). Compulsivity scores did not enter into the equation for the prediction of exercise dependence scores. This suggests that level of compulsivity does not assist in the prediction of exercise dependence scores beyond the variance which is accounted for by these four variables. The categorization of excessive exercise as an obsessive-compulsive disorder, as is suggested by Yates (1991), is questionable.

4.5.4 Exercise Dependence in Aerobics Instructors

Exercise dependence as measured by the CES was not significantly related to age, education level, employment status, health status, marital status, or income level (See Appendix E). This is important because results are more generalizable across these variables. The finding is consistent to what was reported on aerobic fitness class participants, runners, and fitness club members (Furst and Germone, 1993; Napier and Briant,1990). The mean score on the CES was 59.95, which is comparable to those received with fitness club members (Davis et al., 1993) A more recent study completed by Davis et al. (1995) separated fitness club members into high-level exercisers and moderate exercisers and found a mean score of 57.9 among moderate exercisers. The two samples of high-level exercisers showed mean scores of 69.3 and 71.0, somewhat larger than the mean score of aerobics instructors in the present study.

Although the findings of this study cannot indicate with any certainty the prevalence of exercise dependence among aerobics instructors, the two response profiles to the individual questions on the Commitment to Exercise Scale (CES) suggest that a small subset of this population may be at risk for the development of this syndrome. For example, there was a large mean difference between Group A and Group B on Question 2, suggesting that individuals in Group A were more likely to say they were always upset if they were unable to exercise. Possible reasons for this finding include loss of opportunity to exercise, loss of opportunity to socialize, or loss of monies. However, there is no indication that participants considered socializing or money as a primary motivation behind teaching, as neither motivation was significantly related to level of physical activity or CES score (see Table 4.6). It could be that because of the physical and psychological benefits they perceive as receiving from the physical activity, some may experience a need to exercise daily or near-daily basis to reach, as described by Chan (1986), an equilibrium or baseline level of functioning (See Section 4.2.1).

Morgan (1979a) states that one of the most important indicators of 'addictive exercise' is the tendency to continue to exercise even in the face of medical, social, or physical contraindications. Group A participants were more likely to show this tendency as indicated by a large difference in mean scores when asked if they continue to exercise when injured. Also, Group A members were more likely to continue to teach/exercise even when they feel tired or unwell than Group B. This finding, however, is difficult to interpret. It could be indicative of pathological exercise, or a lack of available substitutes to teach the class, or a desire to continue earning money even when fatigued or ill. However, Group A participants were also more likely to feel 'guilty' when missing an exercise session, as indicated by a higher mean on this question than Group B. It is possible, then, that these instructors exercise despite feeling tired or ill in order to avoid feeling guilt. This finding relates to what has been refered to as "Response Omission Anxiety" in exercise dependence (Kline, Franken, & Rowland, 1994; Morrow & Harvey, 1990). In other words, sometimes these aerobics instructors teach in order to avoid experiencing the guilt which occurs if the exercise routine is broken. This can only be speculated on as no specific questions directed at the prevention of withdrawal symptoms were included in the questionnaire. Yet the finding that some instructors feel guilty when missing an exercise session is not surprising and is similar to what has been found by other researchers. For example, Carmack and Martens (1979) found that 23% of runners reported feeling guilty or "let-down" when missing a run. Similarly, Blumenthal et al. (1984) reported that 84% of respondents experienced guilt when they did not exercise.

Finally, Group A members were more likely than Group B to claim that they always turn down an invitation to a social event that interfered with their class/workout schedule. This is similar to what was found by Sachs and Pargman (1979), who found that many of their 'running addicts' make lifestyle changes and give up leisure pursuits to accomodate their workout. Other activities are structured around running in order to permit total commitment. This has been reported by several researchers (Chan, 1986; Morgan, 1979a). A second interpretation of this finding is that because aerobics instructors are paid to do the activity, they have a commitment to teach the class. Therefore, instructors cannot change the time of their workouts as easily as an independent exerciser would be able to.

In addition to the findings from the individual items on the Commitment to Exercise Scale (CES), it is important to note that CES scores were positively correlated with amount of physical activity (r=.209, p<.05). In other words, individuals who scored higher on exercise dependence also tended to exercise more frequently and vigorously, although the correlation is moderate. The strength of the correlation is not entirely surprising, as Davis et al. (1995) reported no relationship between level of physical activity and pathological and obligatory factors of the CES (see Appendix H for comparable correlations). The direction of the relationship, however, is comparable to those found in aerobics class participants (Napier and Briant,1990), runners (Pierce et al., 1993; Thaxton, 1982), and regular exercisers (Kagan and Squires, 1985). This is as expected, since persons more dependent on exercise would demonstrate their dependency by their behavior (Masters and Lambert, 1989). The strength of the correlation is also comparable to previous findings. For example, Kagan and Squires (1985) reported correlations of .34 (<.01) and .25 (p<.01) between the MacAndrew Scale and amount of times exercising and hours of exercising per week respectively.

The positive correlation between CES and level of physical activity suggests that it may be necessary to take steps to prevent the likelihood of suffering from exercise dependence and concomitant overtraining injuries within this population. For example, instructors might be educated about the health-risks associated with frequent high-intensity exercise and how injuries can be prevented by keeping the number of aerobics classes taught per week down to a moderate number. Also, it may be beneficial to educate aerobics instructors on the value of crosstraining and rest.

Further support that the potential for a dependence on exercise exists within a small subsample of the aerobics instructor population comes from comparing the present findings to Veale's (1987) diagnostic criteria for exercise dependence. The seven features and two associated features which compose this criteria were reviewed in Chapter 2, including the experience of withdrawal symptoms with cessation of exercise and concomitant avoidance of these symptoms by further exercise. It was just discussed how both of these criteria are expressed behaviorally in the exercise habits of a subsample of aerobics instructors. The fact that exercise dependence and physical activity level were positively associated also gives some indication that tolerance, another sign of susceptibility to this syndrome, occurs amongst aerobics instructors. That is, higher exercise dependence scores were associated with greater levels of physical activity. The aerobics instructors in Group A were also more likely than Group B to express two of the most convincing symptoms of exercise dependence (Morgan, 1979a). That is, Group A participants were more likely to continue exercising in the face of social or physical contraindications. In sum, this subsample of aerobics instructors were found to be more likely to evidence exercise behaviors that have been used by other researchers to diagnose exercise dependence (Chan, 1986; Veale, 1987).

As previously mentioned, it is impossible to determine from the findings of this study the frequency of occurrence of exercise dependence among fitness instructors. The CES has no cutoff score above which individuals are labelled as exercise dependent. The current study used the 25 scores which fell one standard deviation above the mean to distinguish between those who scored high on exercise dependence and those who did not. Of these 25 instructors (Group A), over half scored above average on compulsivity, perfectionism, and poor body image, and a large minority scored above the mean on level of physical activity. Also, 40% of those in Group A scored below the mean on Rosenberg's Self Esteem Scale. In comparison, less than half of Group B scored above the mean on these variables. These findings, along with the correlations presented in Section 4.3, lend some support to the notion that those who are more dependent on exercise are more likely to have low self esteem, poor body image, and higher levels of compulsivity and perfectionism than those who are less dependent on exercise.

4.5.5 Limitations and Contributions of the Research

Several methodological issues must be noted. The current study yielded a response rate of 55%. However, there is no way of determining from the information received whether the aerobics instructors who responded are representative of those who chose not to respond. This is a common problem with studies of this kind. Also, no comparison or control group was used in this study. Future studies may benefit from having a non-exercising group fill out the questionnaire and compare results to those of the exercising population. In this study, it is hoped that the systematic sampling method used helped to ensure representativeness in the findings. The fact that the sample was drawn from the total population of aerobics instructors in the province of Alberta makes it a more representative study than previous studies on exercise dependence in aerobics instructors.

Another issue is that the CES as a measure of exercise dependence may be considered problematic in this study for two reasons. First, there are no clearly defined demarcations between dependent and nondependent exercisers. The current study may have benefited from the use of a self-rating of exercise dependence to compare to the CES score. This would clarify whether those who scored high on exercise dependence also considered themselves to be dependent on exercise. Second, items on the CES may not have been as appropriate for aerobics instructors as for exercisers. For example, one question on the CES asked respondents if they feel guilty about missing an exercise session. Aerobics instructors may feel guilty about missing a class for two reasons. They may feel guilty about missing the opportunity to exercise, or they may feel guilty because they have commited to teaching that class and get paid to do so. Given the information received from the questionnaires, there is no way of determining what the instructors who responded to this question were refering to.

Another issue is that any knowledge of the purpose of the study may have biased individuals to respond so as to appear healthy. A final limitation may have been the time of year the study was completed. Questionnaires were sent out in December, which is problematic for several reasons. December tends to be a busy time of year for people, and many individuals may not have had the time to complete and return the questionnaire, which may have biased the sample. December is also a time of year when there is a drop in number of fitness classes, which may have influenced responses to some questions (e.g., level of physical activity over the last month), thereby jeopardizing the validity of some findings.

This work extends previous studies in the following ways:

1. The sample composition was unique in that a mode of exercise that was previously not studied quantitatively was used (Pierce, 1994). The sample also consisted of females, which was unique because previous research has typically used males (Furst & Germone,

1993). Finally, exercise dependence was examined across a sample which engaged in varying levels of physical activity, as was encouraged by Pierce (1994).

2. The sample size used in the present study (N=155) was somewhat larger than those used in similar studies (Chapman & DeCastro, 1990; Krejci et al., 1992; Rudy & Estok, 1989). Further, the sample was randomly selected from the entire population of aerobics instructors in the province of Alberta. This facilitates generalizing the results to the population of aerobics instructors. It has also been suggested that research needs to be conducted using exercisers with varying degrees of exercise dependence (Krejci et al., 1992). Aerobics instructors with varying degrees of exercise dependence (as measured by the CES) were compared on various psychological scales.

3. The quantitative nature to this study extended on previous research, as our understanding of exercise dependence has been limited by a lack of objective measures (Hauck and Blumenthal, 1992).

4. A unique combination of variables (perfectionism, self esteem, body dissatisfaction, physical activity) were found to predict CES. These variables have been previously identified as important (Zaitz, 1989), but they have never been investigated quantitatively and at the same time in a multivariate analysis.

The present results provide little evidence that there was a major problem of exercise dependence within a sample of aerobics instructors. The results also suggest that generally speaking the dependent aerobics instructor is a perfectionist who exercises frequently, is low in self esteem and carries with her a poor body image. Although this profile applies to only a minority of instructors, some believe that it is nonpathological personality characteristics such as persistence and perfectionism that places individuals at risk of excessive and dependent exercise, and that such behavior is an attempt to hide a low self-esteem and poor body image (Yates et al., 1992; Zaitz, 1989). Beauty, strength, muscle volume, and/or stamina come to represent perfection in the minds of those who abuse exercise (De la Torre, 1995), and exercise is the means by which to attain perfection and strengthen a fragile self-image. But when the pursuit of this image is thwarted or the feeling of good functioning is fractured, one is forced to deal with the lack of self-esteem (De la Torre, 1995). The behavioral expression of this is the stringent manner in which these individuals exercise (Yates et al., 1992). The aerobics instructors in her case studies pointed out to Zaitz (1989) that "... even worse than the amount of exercise they engage in is the attitude behind their workouts. This attitude of 'I must be the best' (the toughest teacher, the thinnest)..." is what creates the dependency upon the activity (p.42). Zerbe (1988) contends that it is the "women's movement, which has enabled females to make important strides in so many aspects of life, (that) has also brought concomitant expectancies for today's young woman. It is implied that she can be all things, and do them well, thereby exacerbating any innate tendencies toward perfectionism." (p. 23). Although no assumptions regarding direction of causality can be made from this study, it is hoped that this research has made steps towards untangling the associations among excessive exercising and personality risk factors (Davis et al., 1993).

CHAPTER 5

Summary, Future Directions, and Conclusions

5.1 Summary of the Study.

This research was correlational and descriptive in nature. The purpose of this study was to examine the relationships between exercise dependence and compulsivity, perfectionism, self esteem, and body image in aerobics instructors. It was also explored whether a segment of the aerobics instructor population (those scoring higher on the CES) tended to have a distinctive profile on certain characteristics suggested by previous researchers to be symptomatic of exercise dependence.

Subjects were chosen randomly from a list of certified fitness instructors. The list was received from the AFLCA and questionnaires were mailed out to individuals according to the systematic sampling procedure. The questionnaire included the following psychological scales/subscales:

1. Commitment to Exercise Scale
2. Rosenberg's Self Esteem Scale
3. Body Dissatisfaction subscale of the Eating Disorder Inventory
4. Obsessive-Compulsive subscale of the SCL-90
5. Self-Oriented subscale of the Multidimentional Perfectionism Scale

Subjects also provided information describing the frequency, intensity, duration, and types of exercise pursued in the month prior to completing the questionnaire, as well as their motivation for teaching aerobic fitness classes. Pearson Product Moment correlations indicated that higher scores on exercise dependence were associated with elevated scores on perfectionism, compulsivity, and body dissatisfaction, and lower scores on self esteem. From a stepwise multiple regression procedure, it was found that perfectionism, body dissatisfaction, self esteem, and physical activity contributed significantly to the prediction of CES. Finally, an exploratory analysis of the 25 individuals who had the highest scores on the CES suggested that there were some differences in the motivational and psychological profiles of those who scored higher on the CES (one SD above the mean) than those who scored lower on the CES, but generally there were no large differences between the two groups. There are two possible reasons for this finding; a) that exercise dependence does not prevail to any great extent among this sample of aerobics instructors b) that the validity of the CES for measuring exercise dependence is questionable.

5.2 Recommendations for Future Directions.

5.2.1Measurement of Exercise Dependence

Although the CES is an important step towards the quantitative measure of exercise dependence, the scale requires even further psychometric validation . Also, studies on exercise dependence must ensure that a valid and reliable measure of exercise dependence is being used rather than relying on behavioral measures or self-report ratings of dependence. This was discussed in detail in Section 2.7.

5.2.2Delineation of Exercise Dependence

The CES and other scales measuring exercise dependence need to set a clear score at which a person is considered dependent to simplify comparisons. Also, there is a need to develop norms to help identify problematic dependence levels.

5.2.3 Sample Populations

There is insufficient evidence that individuals comprising the validation samples are truly dependent on exercise (See Section 2.7). Also, validation studies would benefit from the use of larger and random samples (Masters & Lambert, 1989).

5.2.4 Study Design

Due to the retrospective nature of this study, data depended strongly on participants' memory and recall. Future studies should attempt to overcome this weakness through the use of prospective or longitudinal studies which do not rely as heavily on memory.

5.3 Conclusions.

On the basis of the results of this investigation the following conclusions are drawn:

1. There is a significant, but modest positive correlation ($r=.197$, $p<.05$) between exercise dependence and compulsivity. Therefore, there is some tendency for those individuals who scored higher on exercise dependence to score higher on compulsivity than those who scored lower on exercise dependence.

2. There is a significant positive correlation ($r=.314$, $p<.001$) between exercise dependence and perfectionism. Those who scored higher on the CES also tended to hold higher personal expectations than individuals who scored lower on the CES.

3. There is a significant, but modest positive correlation ($r=.228$, $p<.05$) between exercise dependence and body dissatisfaction. Therefore, individuals with higher scores on exercise

dependence tended to be less satisfied with their body shape and size than those who scored lower on exercise dependence.

4. There is a significant, but modest negative correlation ($r=-.20$, $p<.05$) between exercise dependence and self esteem. Therefore, individuals scoring higher on a measure of exercise dependence tended to score lower on self esteem.

5. Three psychological variables (perfectionism, self esteem, body dissatisfaction) and physical activity made significant contributions to the prediction of CES score. Compulsivity scores did not increase the predictability of CES beyond what was contributed by these variables.

6. Perfectionism, self esteem, physical activity, and body dissatisfaction accounted for 19.6% of the variance in CES scores.

7. Although some differences exist in the psychological and motivational profiles between those who scored higher on the CES and those who scored lower, very few individuals fit Zaitz's profile of the dependent aerobics instructor.

Anshel (1991) stated that research identifying psychological factors that contribute to an exercise dependence is missing. It is hoped that this research has taken steps in this direction. It is important that further research be conducted in this area as increasing numbers of females are engaging in vigorous exercise (Wiseman, Gray, & Mosimann, 1992). De la Torre (1995) concludes that:

> A cursory look at the latest issues of popular magazines easily confirms the continued growth in our culture's interest and preoccupation with exercise. As a result, clinicians should expect to find more cases among their patients for whom exercise might represent a measure of psychopathology, which should be properly diagnosed so that it can be appropriately addressed in therapy (p.29).

Since many women may turn to the aerobics fitness class to provide them with a well-balanced workout, it is important to study this group of influential leaders, as overzealousness on their part may substantially influence the exercise habits of their participants. The current research lends support to a notion put forward by Davis (1990). That is, the positive correlation between physical activity level and perfectionism provides some evidence that excessive exercise, like strict dieting, may reflect body perfectionism among women. Diet and exercise are both means of controlling one's body, of fashioning it's appearance or performance to approximate an ideal (Yates et al., 1994). With increasing attention to exercise, the nineties may see a greater use of physical activity instead of dieting to regulate body shape, mood, and self-esteem.

BIBLIOGRAPHY

Altemus,M.,Pigott,T.,Kalogeras,K.,Demitrack,M.,Dubbert,B., Murphy,D., & Gold,P. (1992). Abnormalities in the regulation of vasopressin and corticotropin releasing factor secretion in obsessive - compulsive disorder. Archives of General Psychiatry,49, 9-16.

Anshel,M.H. (1991). A psycho-behavioral analysis of addicted versus non-addicted male and female exercisers. Journal of Sport Behavior, 14 (2), 145-154.

American Psychiatric Association:DSM-3:Diagnostic and Statistical Manual of Mental Disorders.3rd ed.(American Psychiatric Association. Washington,D.C.,1980).

Baker,P.M., and Gallant, M.J. (1985). Self-esteem: measurement strategies and problems. Humboldt Journal of Social Relations, 12 (1), 36-48.

Barratt,J.R. (1994). Exercise addiction. In Mellion,M.B. (Ed.). Sports Medicine Secrets (pg.141-144). Philadelphia:Hanley & Belfus Inc.

Beaumont, P., Touyz, S., & Hook, S. (1983). Excessive exercise in anorexia nervosa. Paper read at The International Conference on Anorexia Nervosa and Related Disorders, University College Swansea

Benyo,R. (1990). The Exercise Fix.Champaign,Il;Leisure.

Blumenthal,J.A., O'Toole,L., & Chang,J. (1984). Is running an analogue of anorexia nervosa: An empirical study of obligatory running and anorexia nervosa. Journal of the American Medical Association, 252 (4), 520-524.

Blumenthal,J.A.,Rose,S.,and Chang,J.L. (1985). Anorexia nervosa and exercise:implications from recent findings.Sports Medicine. 2, 237-247.

Brehm, B. (1992). The runner's high: Glow with the flow. Fitness Management, Jan., 26-27.

Callen,K. (1987). Eating disorders and long-distance running: the ascetic condition (commentary). Integrative Psychiatry,5, 201-211.

Canada Fitness Survey (1982). Canada's fitness: Preliminary findings of the 1981 survey. Canadian Federal Ministry of Fitness and Amateur Sport, Ottawa, Canada.

Carmack,M., & Martens,R. (1979). Measuring commitment to running: a survey of runners' attitudes and mental states. Journal of Sport Psychology, 1, 25-42.

Chalmers,J.,Catalan,J.,Day,A.,& Fairburn,C. (1985). Anorexia nervosa presenting as morbid exercising. Lancet,1, 286-287.

Chan,C. (1986). Addicted to exercise. Encyclopedia Brittanica Medical and Health Annual, 429-432.

Chan, C., & Grossman, H. (1988). Psychological effects of running loss on consistent runners. Perceptual and Motor Skills, 66, 875-883.

Chapman,C., & DeCastro,J. (1990). Running addiction: measurement and associated psychological characteristics. Journal of Sports Medicine and Physical Fitness, 30, 283-290.

Clark, N. (1991). A dedicated athlete or compulsive exerciser? The American Ski Coach, 14 (3),18-19.

Cohen,M. (1987). Eating disorders and long-distance running: the ascetic condition (commentary). Integrative Psychiatry,5, 201-211.

Cooper, P.J., & Taylor, M.J. (1988). Body image disturbance in bulimia nervosa. British Journal of Psychiatry, 153, 32-36.

Cox, W.M. (1985). Personality correlates of substance abuse. Determinants of Substance Abuse:Biological, Psychological, and Environmental Factors (pp.209-226). In M. Galazio and S.A. Maisto (Eds.). New York: Plenum Press.

Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, 297-334.

Crossman,J.,Jamieson,J.& Henderson,L. (1987). Responses of competitive athletes to layoffs in training. Journal of Sport Behavior,10 (1), 28-38.

Crowther,J.H., Lilly, R.S., Crawford, P.A., Shepherd, K.L., & Oliver, L.L. (1990). The stability of the Eating Disorder Inventory. Paper presented at the Annual Meeting of the American Psychological Association, Boston, MA.

Davis,C. (1990). Body image and weight preoccupation: A comparison between exercising and non-exercising women. Appetite, 15, 13-21.

Davis,C. (1991). Relationships between exercise and eating disorders: current perspectives. Bulletin of the National Eating Disorder Information Centre, 6 (5), 1-2.

Davis, C., Brewer, H., & Ratusny, D. (1993). Behavioral frequency and psychological commitment: Necessary concepts in the study of excessive exercising. Journal of Behavioral Medicine, 16 (6), 611-628.

Davis, C., & Cowles, M. (1991). Body image and exercise: A study of relationships and comparisons between physically active men and women. Sex Roles, 25 (1/2), 33-44.

Davis, C., Elliott, S., Dionne, M., & Mitchell, I. (1991). The relationship of personality factors and physical activity to body satisfaction in men. Personality and Individual Differences, 12 (7), 689-694.

Davis, C., & Fox, J. (1993). Excessive exercise and weight preoccupation in women. Addictive Behaviors, 18, 201-211.

Davis, C., Fox, J., Cowles, M.P., Hastings, P., & Schwass, K. (1990). The functional role of exercise in the development of weight and diet concerns in women. Journal of Psychosomatic Research, 34 (5), 563-574.

Davis, C., Kennedy, S., Ralevski, E., Dionne, M., Brewer, H., Neitzert, C., & Ratusny, D. (1995). Obsessive-compulsiveness and physical activity in anorexia nervosa and high level exercising. Journal of Psychosomatic Research,

DeBenette,V. (1990). Are your patients exercising too much? Physician and Sportsmedicine,18 (8), 119-122.

DeFries,Z. (1981). Running madness: A prelude to real madness. In M.H. Sacks & M.L. Sachs (Eds.). Psychology of Running (pg.261-266). Champaign Illinois: Human Kinetics Publishers.

De la Torre, J. (1995). Mens sana in corpore sano, or exercise abuse: clinical considerations. Bulletin of the Menninger Clinic, 59 (1), 15-31.

Demitrack,M., Kalogeras, K., Altemus,M., Pigott,T., Listwak, S., & Gold, P. (1992). Plasma and cerebrospinal fluid measures of arginine vasopressin secretion in patients with bulimia nervosa and in healthy subjects. Journal of Clinical and Endocrinological Metabolism, 74, 1277-1283.

Demo, D.H. (1985). The measurement of self-esteem: Refining our methods. Journal of Personality and Social Psychology, 48 (6), 1490-1502.

Derogatis, L.R., Lipman, R.S., Covi, L., et al. (1970). Dimensions of outpatient neurotic pathology: Comparisons of a clinical vs. an empirical assessment. Journal of Consulting and Clinical Psychology, 34, 164-171.

Derogatis, L.R., Lipman, R.S., Covi, L., et al. (1971). Neurotic symptom dimensions as perceived by psychiatrists and patients of various social classes. Archives of General Psychiatry, 24, 454-464.

Derogatis, L.R., Lipman, R.S., & Covi, L. (1973). SCL-90: An outpatient psychiatric rating scale-preliminary report. Psychopharmacology Bulletin, 9, 13-28.

Derogatis, L.R., Rickels, K., & Rock, A.F. (1976). The SCL-90 and the MMPI: A step in the validation of a new self-report scale. British Journal of Psychiatry, 128, 280-289.

De Vaus, D.A. (1991). Surveys in Social Research. London: UCL Press Ltd.

Dishman, R.K. (1985). Medical psychology in exercise and sport. Medical Clinics of North America,69, 123-143.

Donovan, D.M. (1988). Assessment of addictive behaviors: implications of an emerging biopsychosocial model.In D.M.Donovan and G.A.Marlatt (Eds.).Assessment of Addictive Behaviors(pg.3-48). New York:Guilford Press.

Drummond, D. (1991). Dependence on psychoactive drugs: finding a common language. In I.L.Glass (Ed.). The International Handbook of Addiction Behavior (pg.5-10). New York: Tavistock/ Routledge.

Eisler, I., & LeGrange, D. (1990). Excessive exercise and anorexia nervosa. International Journal of Eating Disorders, 7, 475-485.

Eldredge, K., Wilson, G.T., & Whaley, A. (1990). Failure, self evaluation, and feeling fat in women. International Journal of Eating Disorders, 9, 37-50.

Epling,W., & Pierce,W. (1984). Activity-based anorexia in rats as a function of opportunity to run on an activity wheel. Nutrition and Behavior,2, 37-49.

Epling,W., & Pierce,W. (1988). Activity-based anorexia: A biobehavioral perspective. The International Journal of Eating Disorders,7, 475-485.

Epling,W., & Pierce,W. (1989). Excessive activity and anorexia in rats. In K.M. Pirke, W. Wuttkeand, U.Schweiger (Eds.). The menstrual cycle and its disorders: Influences of nutrition, exercise, and neurotransmitters. New York: Springer-Verlag.

Estok, P., & Rudy, E.(1986). Physical, psychosocial, menstrual, changes/risks, and addiction in the female marathon and nonmarathon runner. Health Care for Women International, 7, 187-202.

Fentem,P.H. (1994). Benefits of exercise in health and disease. British Medical Journal,307,1291-1295.

Foley,K.,Kourides,I.,Inturrisi,C.,Kaiko,R.,Zaroulis,C.,Posner,J., Houde,R., & Hao Li,C. (1979). Beta-endorphins: Analgesic and hormonal effects in humans. Proceedings of the National Academy of Sciences of the United States of America,76, 5377-5381.

Fox,S.I. (1993). Human Physiology (6th ed.). Oxford, England: Wm. C. Brown Publishers.

Frieze,I., Olsen,J., & Good,D. (1990). Perceived and actual discrimination in the salaries of male and female managers. Journal of Applied Social Psychology,20, 63-71.

Furst,D.M., & Germone, K. (1993). Negative addiction in male and female runners and exercisers. Perceptual and Motor Skills,77,192-194.

Garner, D.M., Shafer, C.L., & Rosen, L.W. (1991). Critical appraisal of the DSM-3-R diagnostic criteria for eating disorders. In S.R. Hooper, G.W. Hynd, & R.E. Mattison (Eds.). Child Psychopathology: Diagnostic criteria and clinical assessment: Current issues and procedures: Vol.1. Psychiatric Disorders. New Jersey:Lawrence Erlbaum Associates.

Garner, D.M., & Olmsted, M.P. (1984). The Eating Disorder Inventory Manual. Odessa, Florida: Psychological Assessment Resources.

Garner, D.M., Olmsted, M.P., & Polivy, J. (1983). Development and validation of a multidimensional Eating Disorder Inventory for Anorexia nervosa and bulimia. International Journal of Eating Disorders, 2,15-34.

Getchell,B. (1992). Physical Fitness:A Way of Life.New York:MacMillan Publishing Co.

Glass,G.V., & Hopkins,K.D. (1984). Statistical Methods in Education and Psychology.Boston: Allyn and Bacon.

Glasser,W. (1976). Positive Addiction. New York:Harper and Row.

Gold,P., Kaye,W., Robertson,G., & Ebert,M. (1983). Abnormalities in plasma and cerebrospinal fluid arginine vasopressin in patients with anorexia nervosa. New England Journal of Medicine, 308, 1117-1123.

Goldfarb,L., & Plante,T. (1984). Fear of fat in runners: an examination of the connection between anorexia nervosa and distance running. Psychological Reports, 55, 2961.

Hailey,B., & Bailey,L. (1982). Negative addiction in runners: a quantitative approach. Journal of Sport Behavior, 5 (3), 150-154.

Hauck,E.M. & Blumenthal,J.A. (1992). Obsessive and compulsive traits in athletes.Sports Medicine,14 (4),215-227.

Henderson, K.A. (1991). Dimensions of Choice: A Qualitative Approach to Recreation, Parks, and Leisure Research. State College, PA: Venture Publishing.

Hertung,G., & Farge,E. (1981). Compulsive or excess sports.In S. Mule (Ed.).Behavior in Excess(pg.297-312).New York:Free Press.

Hewitt, P.L., & Flett, G.L. (1991). Perfectionism in the self and social contexts: Conceptualization, assessment, and association with psychopathology. Journal of Personality and Social Psychology,60 (3), 456-470.

Hollender, M. (1965). Perfectionism. Comprehensive Psychiatry,6 (2), 94-103.

Holmes, T., Chamberlin, P., & Young, M. (1994). Relations of exercise to body image and sexual desirability among a sample of university students. Psychological Reports, 74, 920-922.

Ingram, D. (1982). Compulsive personality disorder. The American Journal of Psychoanalysis, 42 (3), 189-199.

Jacobs, L.W. (1980). Running as an addiction process. PhD. dissertation, University of Alberta.

Janal, M.,Colt, E.,Clark,W., & Glusman, M. (1984). Pain sensitivity, mood and plasma endocrine levels in man following long-distance running: Effects of naloxone. Pain,19, 13-25.

Kagan,D.M., & Squires,R.L. (1985). Addictive aspects of physical exercise. Journal of Sports Medicine,25,227-237.

Kagan,D.M. (1987). Addictive personality factors. The Journal of Psychology,121 (6),533-538.

Kaldestad, E. (1994). A re-evaluation of the psychometric properties of the Basic Character Inventory. Scandinavian Journal of Psychology, 35, 165-174.

Katz,(1986). Long distance running, anorexia nervosa, and bulimia: A report of two cases. Comprehensive Psychiatry, 27, 74-78.

Kline, T., Franken, R., & Rowand G. (1994). A psychometric evaluation of the Exercise Salience Scale. Journal of Personality and Individual Differences, 16 (3), 509-511.

Krejci,R.C., Sargent,R.,Forand, K.J.,Ureda,J.R.,Saunders,R.P., and Durstine, J.L. (1992). Psychological and behavioral differences among females classified as bulimic, obligatory exerciser and normal control. Psychiatry, 55, 185-193.

Kostrubala,T. (1976). The Joy of Running. Philadelphia: J.B. Lippincott Company.

Little,J.C. (1979). Neurotic illness in fitness fanatics. Psychiatric Annals,9,49-56.

Lyons,H.A., and Cromey,R. (1989). Compulsive jogging:exercise dependance and associated disorder of eating. The Ulster Medical Journal, 58 (1),100-102.

Mallick, M.J., Whipple,T.W., & Huerta, E. (1987). Behavioral and psychological traits of weight-conscious teenagers: A comparison of eating-disordered patients and high- and low-risk groups. Adolescence, 22, 157-168.

Markoff,R.,Ryan,P., & Young,T. (1982). Endorphins and mood changes in long-distance running. Medicine and Science in Sports and Exercise,14 (1), 11-15.

Marlatt, G., & Gordon, J.(Eds.) (1985). Relapse prevention: Maintenance strategies in the treatment of addictive behaviors. New York: Guilford Press.

Masters,K., & Lambert,M. (1989). On gender comparison and construct validity: an examination of the Commitment to Running scale in a sample of marathon runners. Journal of Sport Behavior, 12 (2), 196-202.

Miller,M. (1992). Addiction to exercise.Fitlines.Winter,1-3.

Morgan,W.P. (1979a). Negative addiction in runners. Physician and Sportsmedicine, 7 (2), 55-69.

Morgan,W.P. (1979b). Anxiety reduction following acute physical activity. Psychiatric Annals,9,36-45.

Morgan,W.P. (1985). Affective beneficience of vigorous physical activity.Medicine and Science in Sports and Exercise,17 (1),94-100.

Morgan,W.P.& O'Connor, P.J. (1989). Psychological effects of exercise and sports. In Ryan and Allman(Eds.).Sports Medicine,2nd ed., Academic Press;San Diego.

Morris, M., Steinberg, H., Sykes, E., & Salmon, P. (1990). Effects of temporary withdrawal from regular running. Journal of Psychosomatic Research, 34(5), 493-500.

Morrow, J., & Harvey, P. (1990). Exermania! American Health, Nov., 31-32.

Napier,S., & Briant,L. (1990). A study of exercise addiction in commercially based aerobics classes. In Conference proceedings (vol.3). Commonwealth and International Conference on Physical Education, Sport, Health, Dance, Recreation and Leisure,154-163.

Norring, C. (1989). Psychological diagnosis and prognosis in eating disorders: Ego functioning and the Eating Disorder Inventory. Acta Universitatis Upsaliensis, Comprehensive Summaries of Uppsala Dissertaions from the Faculty of Medicine, 207.

Nudelman,S., Rosen,J., & Leitenberg,H. (1988). Dissimilarities in eating attitudes, body image distortion, depression, and self-esteem between high intensity male runners and women with bulimia nervosa. International Journal of Eating Disorders, 7, 625-634.

Pargman, D., & Burgess, S. (1977). Hooked on exercise: a psycho-biological explanation. Paper presented at the annual conference of the North American Society for the Psychology of Sport and Physical Activity. Ithaca, New York.

Pasman,L., & Thompson,J. (1988). Body image and eating disturbance in obligatory runners, obligatory weight lifters, and sedentary individuals. International Journal of Eating Disorders, 7 (6), 759-769.

Peele,S. (1981).How Much is Too Much: Healthy Habits or Destructive Addictions.Englewood Cliffs,N.J.;Prentice-Hall Inc.

Peele,S. (1988). The nature of the beast.In S.Peele (Ed.).Visions of Addiction:Major Contemporary Perspectives on Addiction and Alcoholism (pg.1-8).Toronto:Lexington Books.

Peele,S. (1989). Diseasing of America: Addiction Treatment Out of Control. Toronto: Lexington Books.

Peele,S. & Brodsky,A. (1991).The Truth About Addiction and Recovery. New York: Simon and Schuster.

Pierce,E.F.,Daleng,M.L., & McGowan, R.W. (1993a). Scores on exercise dependence among dancers. Perceptual and Motor Skills, 76, 531-535.

Pierce, E., & Eastman,N. (1993). Beta-endorphin response to endurance exercise: relationship to exercise dependence. Perceptual and Motor Skills, 77, 767-770.

Pierce,E.F., McGowan,R.W., & Lynn,T.D. (1993b). Exercise dependence in relation to competitive orientation of runners. Journal of Sports Medicine and Physical Fitness, 33, 189-193.

Pierce,E. (1994). Exercise dependence syndrome in runners.Sports Medicine,18 (3),149-155.

Pierce,W., Epling,W., & Boer,D. (1986). Deprivation and satiation: The interrelations between food and wheel running. Journal of Experimental Analysis of Behavior,46, 199-210.

Polivy,J. (1994). Exercise and compulsive behavior.Draft of a manuscript for the International Consensus Symposium on Physical Activity, Fitness, and Health.

Pollack,J.M. (1979). Obsessive-compulsive personality: A review. Psychological Bulletin,36,225-241.

Powers,P. (1987). Eating disorders and long-distance running: the ascetic condition (commentary). Integrative Psychiatry,5, 201-211.

Raciti, M.C., & Norcross, J.C. (1987). The EAT and EDI: Screening, interrelationships, and psychometrics. International Journal of Eating Disorders, 6,579-586.

Raglin,J.S. (1990). Exercise and mental health:beneficial and detrimental effects.Sports medicine,9 (6),323-329.

Ray, O., & Ksir, C. (1993). Drugs, Society, and Human Behavior (6th ed.). Toronto: Mosby.

Reed,G.F. (1985).Obsessional Experience and Compulsive Behavior:A Cognitive-Structural Approach.Orlando:Academic Press Inc.

Restak,R. (1987). Eating disorders and long-distance running: the ascetic condition (commentary). Integrative Psychiatry,5, 201-211.

Rickels, K., Lipman, R.S., Garcia, C.R., et al (1972). Evaluating clinical improvement in anxious outpatients: A comparison of normal and treated neurotic patients. American Journal of Psychiatry, 128, 1005-1009.

Robbins, J.M., & Joseph, P. (1985). Experiencing exercise withdrawal: possible consequences of therapeutic and mastery running. Journal of Sport Psychology, 7, 23-39.

Robson,P.J. (1988). Self-esteem: A psychiatric perspective. British Journal of Psychiatry,153,6-15.

Rodin, J. (1992).Body Traps:Breaking the binds that keep you from feeling good about your body.New York;William Morrow and Company, Inc.

Rosenberg, M. (1965). Society and the Adolescent Self-Image. Princeton,NJ: Princeton University Press.

Rudy, E.B.,& Estok,P.J. (1989). Measurement and significance of negative addiction in runners.Western Journal of Nursing Research,11(5),548-558.

Rydelius, P.A. (1983). Alcohol-abusing teenage boys: Testing a hypothesis on alcohol abuse and personality factors using a personality inventory. Acta Psychiatrica Scandinavica,68,381-385.

Sachs, M.L. (1981). Running addiction.In M.H. Sacks and M.L. Sachs(Ed.). Psychology of Running(pg.116-126).Champaign:Human Kinetics.

Sachs, M.L. (1987). Compliance and addiction to exercise.In R.C.Cantu (Ed.).TheExercising Adult(pg.19-27).New York: MacMillan Publishing.

Sachs, M.L.& Pargman,D. (1979). Running addiction:a depth interview examination.Journal of Sport Behavior,2,143-155.

Sacks, M. (1981). Running addiction:a clinical report.In M.D. Sacks and M.L.Sachs (Eds.) Psychology of Running (pg.127-130). Champaign: Human Kinetics.

Sacks,M. (1986). Exercise addiction. Sports Medicine Digest,8 (12), 1-3.

Sacks,M. (1987). Eating disorders and long-distance running: the ascetic condition (commentary). Integrative Psychiatry,5, 201-211.

Schwarz,L.& Kindermann,W. (1992). Changes in beta-endorphin levels in response to aerobic and anaerobic exercise. Sports Medicine, 13 (1),25-36.

Secord,P.F., & Jourard,S.M. (1953). The appraisal of body-cathexis: Body cathexis and the self. Journal of Consulting Psychology,17 (5),343-347.

Siegel, S., Krank, M., & Riley, E. (1988). Anticiaption of pharmacological and nonpharmacological events: Classical conditioning and addictive behavior. In S. Peele (Ed.). Visions of Addiction: Major Contemporary Perspectives on Addiction and Alcoholism (pg. 85-116). Lexington, Massechusets: Lexington Books.

Silber,E., & Tippett, J.S. (1965). Self-esteem: Clinical assessment and measurement validation. Psychological Reports,16,1017-1071.

Solomon, R.L. (1980). The opponent process theory of acquired motivation. American Psychologist, 35, 691-712.

Sonstroem, R., Harlow, L., & Josephs, L. (1994). Exercise and self-esteem: validity of model expansion and exercise associations. Journal of Sport and Exercise Psychology, 16, 29-42.

Sorotzin, B.(1985). The quest for perfection: Avoiding shame or avoiding guilt? Psychotherapy, 22 (3), 564-571.

Sours, J.A. (1981). Running,anorexia nervosa, and perfection. In M.D.Sacks and M.L.Sachs (Eds.).Psychology of Running (pg. 80-91). Champaign:Human Kinetics.

Thaxton, L. (1982). Physiological and psychological effects of short-term exercise addiction on habitual runners. Journal of Sport Psychology, 4, 73-80.

Thompson, J.K., & Blanton, P. (1987). Energy conservation and exercise dependance: a sympathetic arousal hypothesis. Medicine and Science in Sports and Exercise, 19 (2), 91-98.

Toner, B.B., Garfinkel, P.E., & Garner, D.M. (1987). Long-term follow-up of anorexia nervosa. Psychiatry Digest, 3, 28-29.

Twerski, A. (1990).Addictive Thinking:Understanding Self Deception. New York; Harper Collins Publishers.

Van DenBerg, P.J., & Helstone, F.S. (1975). Oral, obsessive, and hysterical personality patterns: A Dutch replication. Journal of Psychiatric Research, 12,319-327.

Van Ree, J.M., Hijman, R., Jolles, J., & DeWied, D. (1985). Vasopressin and related peptides: animal and human studies. Neuropharmacology and Biological Psychiatry, 9, 551-559.

Veale,D.M.W. (1987). Exercise dependence.British Journal of Addiction,82,735-740.

Veale,D.M.W. (1991). Psychological aspects of staleness and dependence on exercise. International Journal of Sports Medicine,12, S19-S22.

Veale,D.M.W. (1993). Exercise addiction. Coaching Focus,22 (Spr), 17-18.

Wear, R.W., & Pratz, O. (1987). Test-retest reliability for the Eating Disorder Inventory. International Journal of Eating Disorders,6,767-769.

Welch,G. (1988). Selected multivariate statistical techniques and eating disorders. Unpublished doctoral dissertation, University of Otago, New Zealand.

Welch, G., Hall, A., & Norring, C. (1990). The factor structure of the Eating Disorder Inventory in a patient setting. International Journal of Eating Disorders, 9,79-85.

Wheeler,G.D.,Wall,S.R., & Belcastro,A.N. (1986). Are anorexic tendencies prevalent in the habitual runner? British Journal of Sports Medicine,20,77-81.

Wichmann,S., & Martin,D.R. (1992). Exercise excess: Treating patients addicted to fitness. The Physician and Sportsmedicine, 20 (5), 193-201.

Williams, R.L., Schaefer,C.A., Shisslak, C.M., Gronwaldt, V.H., & Comerci, G.D. (1986). Eating attitudes and behaviors in adolescent women: Discrimination of normals, dieters, and suspected bulimics using the Eating Attitides Test and Eating Disorder Inventory. International Journal of Eating Disorders,5,879-894.

Yates,A. (1987). Eating disorders and long-distance running: the ascetic condition. Integrative Psychiatry,5, 201-211.

Yates,A. (1991). Compulsive exercise and the eating disorders. New York: Brunner/Mazel.

Yates,A.,Leehey,K.,and Shisslak,C. (1983). Running:an analogue of anorexia? New England Journal of Medicine,308,251-255.

Yates,A., Shisslak,C., Allender,J., Crado,M., & Leehey,K. (1992). Comparing obligatory and nonobligatory runners. Psychosomatics, 33, 180-189.

Yates,A.Shisslak,C.Crago,M.,and Allender,J. (1994). Over- commitment to sport: Is there a relationship to the eating disorders? Clinical Journal of Sports Medicine,4 (1),39-46.

Zaitz,D. (1989). Are you an exercise addict? Idea Today, Jan,41-44.

Zerbe,K. (1988). Compulsivity in athletes. American Rowing,1/2, 22-25.

Zuckerman,M. (1960). The development of an affect adjective checklist for the measurement of anxiety. Journal of Consulting Psychology, 24, 457-462.

APPENDICES

APPENDIX A

"Fitness Informer" Presurvey Contact

My name is Cheryl Cook. I am an AFLCA certified aerobics and weight training instructor. I am also a student at the University of Alberta, working on a Master's degree in Physical Education and Recreation. In order to complete this degree, I am required to complete a thesis, which involves doing research. I have chosen what I consider to be a very timely and important topic, one that affects you directly as an AFLCA leader. The topic I am refering to is exercise dependence. Some of you may receive a questionnaire on this topic in the mail towards the end of September. Please fill out the questionnaire and send it back at your earliest convenience. The faster we get the questionnaires back, the quicker we can organize the information to get it to you, making you a better informed fitness instructor. Thank-you very much for your assistance.

Yours Truly,
Cheryl Cook

APPENDIX B

Cover letter to participants

Introduction:

The following questions have been developed in order to obtain information about how personal image relates to amount of physical exercise. Personal image refers to how we think, feel, and see ourselves. As aerobics instructors, we are not only physically active ourselves, we come in contact with many individuals who are also trying to maintain a physically active lifestyle. As a result, aerobics instructors possess tremendous influence and information that up to this point has been untapped. Your name has been selected at random from a list of qualified instructors currently certified through the AFLCA in your area. We are asking for your assistance in completing this questionnaire because you are a certified aerobics instructor, and your answers are very important to us.

Benefits To Be Derived:

The information you provide will add valuable data to our study on personal image and physical exercise. This information will benefit future aerobics instructors, you as a current aerobics instructor, and indirectly your participants.

Procedure:

The questionnaire will take about 20 minutes to complete. Please consider your answers carefully. All information will be coded with numbers to maintain **CONFIDENTIALITY** - your name and number will be available only to the principal investigator. Data will be stored in a locked cabinet and all information will be reported as group data only. You may refuse to participate or withdraw from the study at any time without prejudice. If you do so, any data pertaining to yourself will be destroyed or returned to you upon request. If you find any questions difficult to answer, or if questions raise concerns you wish to discuss, please contact Cheryl Cook *collect* at (403) 433-2783. Once you have completed all questions, please return the questionnaire in the stamped, self - addressed envelope included with the questionnaire.

An article outlining the findings of the research will appear in the 'Fitness Informer' in August, 1996. However, if you wish to obtain a summary of the research findings prior to this time, please acknowledge this by placing a checkmark in the parentheses below. I would like to take this opportunity to thank you in advance for taking the time to fill out this questionnaire.

Yours sincerely,

Cheryl Cook
Principal Investigator

(   ) Yes, I would like to be sent a summary of the results of this research.

APPENDIX C

Informed Consent Form

I have read and understand the above project description and statement regarding confidentiality of my data. I am aware that data will be grouped and that no one person will be identified by name. I understand that there are no significant risks inherent in participating in this study, that I can withdraw at any time, and have been given the opportunity to ask any questions I might have. I hereby consent to take part in this investigation.

Name____________________________________

Date____________________________

Witness__________________________________

Investigator______________________________

APPENDIX D

Questionnaire

Subject #________________________________

Section 1. Please complete the following information all about you.

1. Please circle one. Male Female

2. Year of birth. ______

3. Please indicate the highest completed level of education.

( ) Less than grade 12 ( ) High school diploma

( ) Some Postsecondary education ( ) University degree

( ) College Diploma ( ) Graduate degree

4. Which work role best describes your employment status?

( ) Employed full-time ( ) Employed part-time

( ) Work in the home (unpaid) ( ) Unemployed

( ) Other (Please specify) __________________________

5. In general, how would you describe your existing state of health?

( ) Poor ( ) Fair

( ) Good ( ) Excellent

6. What is your current marital status?

( ) Never married ( ) Married/Common-law relationship

( ) Widowed ( ) Separated/Divorced

7. What is your household income?

( ) Less than $20,000 ( ) $20,000 to $40,000

( ) $40,000 to $60,000 ( ) More than 60,000

8. Please indicate the physical activities in which you have participated over the last month.

	FREQUENCY	DURATION				INTENSITY		
		1-15	15-30	31-60	60+	LIGHT	MEDIUM	HEAVY
Walking	_____	( )	( )	( )	( )	( )	( )	( )
Bicycling	_____	( )	( )	( )	( )	( )	( )	( )
Swimming	_____	( )	( )	( )	( )	( )	( )	( )
Jog/Running	_____	( )	( )	( )	( )	( )	( )	( )
Gardening	_____	( )	( )	( )	( )	( )	( )	( )
Home Exercises	_____	( )	( )	( )	( )	( )	( )	( )
Ice Skating	_____	( )	( )	( )	( )	( )	( )	( )
X Country Ski	_____	( )	( )	( )	( )	( )	( )	( )
Tennis	_____	( )	( )	( )	( )	( )	( )	( )
Golf	_____	( )	( )	( )	( )	( )	( )	( )
Popular Dance	_____	( )	( )	( )	( )	( )	( )	( )
Baseball/Softball	_____	( )	( )	( )	( )	( )	( )	( )
Alpine Skiing	_____	( )	( )	( )	( )	( )	( )	( )
Ice Hockey	_____	( )	( )	( )	( )	( )	( )	( )
Bowling	_____	( )	( )	( )	( )	( )	( )	( )
Exercise Classes	_____	( )	( )	( )	( )	( )	( )	( )
Racquetball	_____	( )	( )	( )	( )	( )	( )	( )
Curling	_____	( )	( )	( )	( )	( )	( )	( )
Others- Please Specify:								
_______________	_____	( )	( )	( )	( )	( )	( )	( )
_______________	_____	( )	( )	( )	( )	( )	( )	( )
_______________	_____	( )	( )	( )	( )	( )	( )	( )

9. Here is a list of reasons why some instructors teach aerobic fitness classes. How important are each of these to you?

	Very Important	Of Some Importance	Of Little Importance	Of No Importance
To feel better mentally and physically	( )	( )	( )	( )
To be with other people	( )	( )	( )	( )
For pleasure, fun, or excitement	( )	( )	( )	( )
To control weight or to look better	( )	( )	( )	( )
To move better or to improve flexibility	( )	( )	( )	( )
As a challenge to my abilities	( )	( )	( )	( )
To relax or reduce stress	( )	( )	( )	( )
To earn extra money	( )	( )	( )	( )
To learn new things	( )	( )	( )	( )
Because of fitness specialists's advice for improving health in general	( )	( )	( )	( )
Because of doctor's advice for therapy or rehabilitation	( )	( )	( )	( )
Other______________	( )	( )	( )	( )

Section 2. The following are statements describing attitudes to exercise. Please respond by marking on the line under each statement the point on the line which best describes your position (as an aerobics instructor) on the continuum. There are no right or wrong answers.

Sample: How important do you think it is to your general wellbeing not to miss your exercise sessions?

not at all important — very important

1. How important do you think it is to your general wellbeing not to miss your exercise sessions?

not at all important — very important

2. Does it upset you if, for one reason or another, you are unable to exercise?

never upset — always upset

3. If you miss an exercise session, or several sessions, do you try to make them up by putting in more time when you get back?

never — always

4. Do you have a set routine for your exercise sessions, e.g. the same time of day, the same location, the same number of laps, particular exercises, and so on?

no routine — strict routine

5. Do you continue to exercise at times when you feel tired or unwell?

never — always

6. Do you continue to exercise even when you have sustained an exercise-related injury?

never always

7. Do you feel 'guilty' that you have somehow 'let yourself down' when you miss your exercise session?

not at all a great deal

8. Are there times when you turn down an invitation to an interesting social event because it interferes with your exercise schedule?

never always

Section 3. The following statements reflect certain attitudes and interests of persons. There are no right or wrong answers. Read each statement and decide the degree to which it applies to you. Indicate your agreement or disagreement by placing a checkmark in the corresponding parentheses.

Sample: I feel that I am a person of worth, at least on an equal basis with others.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

1. I feel that I am a person of worth, at least on an equal basis with others.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

2. All in all, I am inclined to feel that I am a failure.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

3. I feel that I have a number of good qualities.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

4. I feel I do not have much to be proud of.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

5. I am able to do things as well as most other people.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

6. I wish I could have more respect toward myself.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

7. On the whole, I am satisfied with myself.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

8. I certainly feel useless at times.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

9. I take a positive attitude toward myself.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

10. At times I think I am no good at all.

( ) Strongly agree
( ) Agree
( ) Neither agree nor disagree
( ) Disagree
( ) Strongly Disagree

Section 4. Below is a list of problems and complaints that people sometimes have. There are no right or wrong answers. Read each statement carefully and decide how much that problem has bothered or distressed you during the past including today. Please respond by placing a checkmark in the corresponding parentheses.

HOW MUCH ARE YOU BOTHERED BY:

1. Trouble remembering things.

not at all	a little bit	moderately	quite a bit	extremely
( )	( )	( )	( )	( )

2. Worried about sloppiness or carelessness.

not at all	a little bit	moderately	quite a bit	extremely
( )	( )	( )	( )	( )

3. Feeling blocked into getting things done.

not at all	a little bit	moderately	quite a bit	extremely
( )	( )	( )	( )	( )

4. Having to do things very slowly to insure correctness.

not at all	a little bit	moderately	quite a bit	extremely
( )	( )	( )	( )	( )

5. Having to check and double-check what you so.

not at all	a little bit	moderately	quite a bit	extremely
( )	( )	( )	( )	( )

6. Difficulty making decisions.

not at all	a little bit	moderately	quite a bit	extremely
( )	( )	( )	( )	( )

7. Your mind going blank.

not at all	a little bit	moderately	quite a bit	extremely
( )	( )	( )	( )	( )

8. Unwanted thoughts, words, or ideas that won't leave your mind.

not at all	a little bit	moderately	quite a bit	extremely
( )	( )	( )	( )	( )

9. Trouble concentrating

not at all	a little bit	moderately	quite a bit	extremely
( )	( )	( )	( )	( )

10. Having to repeat the same actions such as touching, counting, washing.

not at all	a little bit	moderately	quite a bit	extremely
( )	( )	( )	( )	( )

Section 5. The following statements reflect certain attitudes, feelings, and behaviors of persons. There are no right or wrong answers. Please read each statement and decide the frequency with which it occurs for you. Indicate your answer by placing a checkmark in the corresponding parentheses.

	Always	Usually	Often	Sometimes	Rarely	Never
1. I think that my stomach is too big.	( )	( )	( )	( )	( )	( )
2. I feel satisfied with the shape of my body.	( )	( )	( )	( )	( )	( )
3. I think that my thighs are too large.	( )	( )	( )	( )	( )	( )
4. I think that my stomach is just the right size.	( )	( )	( )	( )	( )	( )
5. I think my hips are too big.	( )	( )	( )	( )	( )	( )
6. I like the shape of my buttocks.	( )	( )	( )	( )	( )	( )
7. I think that my thighs are just the right size.	( )	( )	( )	( )	( )	( )

8. I think my buttocks are too large.	( )	( )	( )	( )	( )	( )
9. I think that my hips are just the right size.	( )	( )	( )	( )	( )	( )

Section 6. The following statements reflect certain attitudes, feelings, and behaviors of persons. There are no right or wrong answers. Please read each statement and decide the degree to which you agree or disagree with each statement. Indicate your answer by placing a checkmark in the corresponding parentheses.

1. It makes me uneasy to see an error in my work.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

2. I am perfectionistic in setting my goals.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

3. I do not have to be the best at whatever I am doing.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

4. I must work to my full potential at all times.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

5. When I am working on something, I cannot relax until it is perfect.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

6. I never aim for perfection in my work.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

7. I strive to be the best at everything I do.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

8. It is very important that I am perfect in everything I attempt.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

9. I do not have very high goals for myself.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

10. I strive to be as perfect as I can be.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

11. One of my goals is to be perfect in everything I do.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

12. I seldom feel the need to be perfect.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

13. I must always be successful at school or work.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

14. I demand nothing less than perfection of myself.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

15. I set very high standards for myself.

( )	( )	( )	( )	( )	( )	( )
Strongly agree	Agree	Sometimes agree	Neutral	Sometimes disagree	Disagree	Strongly disagree

Thank you very much for completing this survey.

APPENDIX E

ITEMS COMPOSING OBLIGATORY* AND PATHOLOGICAL** EXERCISE

OBLIGATORY ITEMS	PATHOLOGICAL ITEMS
1. How important do you think it is to your general well-being not to miss your exercise sessions? 2. Does it upset you if, for one reason or another, you are unable to exercise? 3. If you miss an exercise session, or several sessions, do you try to make them up by putting in more time when you return? 4.Do you have a set routine for your exercise sessions? 7.Do you feel 'guilty' that you have somehow 'let yourself down' when you miss your exercise session? 8.Are there times when you turn down an invitation to an interesting social event because it interferes with your exercise schedule?	5. Do you continue to exercise at times when you feel tired or unwell? 6. Do you continue to exercise even when you have sustained an exercise-related injury? 7. Do you feel 'guilty' that you have somehow 'let yourself down' when you miss your exercise session? 8. Are there times when you turn down an invitation to an interesting social event because it interferes with your exercise schedule?

*Obligatory exercise describes the degree to which psychological well-being is contingent upon assiduous adherence to a regular and structured exercise regimen.

**Pathological exercise describes the degree to which exercise is continued in the face of adverse circumstances, and when it tends to take precedence over the social component of one's life (Davis et al., 1993).

APPENDIX F

DESCRIPTIVE STATISTICS: INDIVIDUAL ITEMS OF CES

	MD	MEAN	SD
CES1	12	11.66	2.01
CES2	9.55	9.07	2.95
CES3	7.05	6.66	3.45
CES4	9.25	8.45	3.74
CES5	7.35	7.19	3.63
CES6	4.05	4.98	3.35
CES7	7.20	7.10	3.85
CES8	3.80	4.81	3.52

APPENDIX G

Correlation Matrix Of All Variables

CORRELATION MATRIX

- - Correlation Coefficients - -

	Age	Educ	Empl	Healt	Marit	Inco	PA	CES	TOT	SE	BOD	COM	PER
Age	1.000	-	-	-	-	-	-	-	-	-	-	-	-
Educ	-.089	1.000	-	-	-	-	-	-	-	-	-	-	-
Empl	.208	-.133	1.000	-	-	-	-	-	-	-	-	-	-
Healt	.002	.041	-.034	1.000	-	-	-	-	-	-	-	-	-
Marit	.23**	-.061	-.089	-.087	1.000	-	-	-	-	-	-	-	-
Inco	.275+	.063	-.033	.197*	.117	1.000	-	-	-	-	-	-	-
PA	.103	.022	-.016	.23**	-.085	.131	1.000	-	-	-	-	-	-
CES	-.054	-.075	-.025	.009	-.003	-.022	.209*	1.000	-	-	-	-	-
TOT	.095	.013	-.025	.22**	-.082	.124	.994+	.328+	1.000	-	-	-	-
SE	.060	.179*	-.014	.292+	-.002	.179*	.152	-.20*	.126	1.000	-	-	-
BOD	-.137	.046	-.034	-.080	.048	.020	-.097	.23**	-.067	-.28+	1.000	-	-
COM	-.086	-.075	-.024	-.142	.069	-.092	-.17*	.197*	-.139	-.32+	.176*	1.000	-
PER	-.28+	.052	-.073	.131	.067	.0002	.22**	.314+	.25**	.054	.119	.146	1.000

Educ, Education level; Empl, Employment status; Healt, Health status; Marit, Marital status; Inco, Household income; PA, Physical activity; CES, Commitment to Exercise Scale; TOT, CES + PA combined score; RSE, self esteem; BDS, Body image; O-C, compulsivity; PER, Perfectionism.

*$p<0.05$
**$p<0.01$
+$p<0.001$

APPENDIX H

GROUP A: Psychological scores, physical activity scores, and corresponding rank

CES total	PA score	PA rank	RSE score	RSE rank	BDS score	BDS rank	PER score	PER rank	O-C score	O-C rank
107.2	183		34		1		99*	3	15*	
106.8	392*	18	36		22*	5	63		11	
97.25	401*	17	30		11*		86*	22	11	
93.6	493*	10	36		0		83*		2	
91.7	190		29^		12*		73*		16*	25
89	601*	3	30		1		83*		11	
87.05	138		35		3		71*		14*	
85.25	366*	25	26^	129	15*	17	56		6	
83.95	246*		17^	155	22*	4	77*		5	
82.85	525*	6	21^	148	9*		68		7	
80.65	200		29^		9*		89*	14	16*	24
80.55	422*	12	33		1		82*		18*	17
80.15	268*		31		10*		86*	23	16*	23
79.45	378*	23	31		0		80*		15*	
79.3	257*		22^	143	7		82*		7	
78.7	150		25^	137	21*	8	84*		20*	12
77.9	195		31		8*		92*	9	15*	
77.6	76		26^		22*	6	58		14*	
77.5	233		33		15*	16	83*		4	
76.5	170		26^		15*	20	62		14*	
76.45	172		27^		7		62		13*	
76.4	290*		25^	136	9*		83*		2	
76.35	180		38		19*	11	68		7	
75.75	472*	11	30		4		55		13*	
75.75	288*		35		7		84*		9	

*Those scores above the mean for that scale.
^Those scores below the mean for that scale.

APPENDIX I

Pearson Correlation Coefficients - Obligatory Exercise (OE), Pathological Exercise (PE), PA, And Selected Psychological Variables

	OE	PE	RSE	BDS	PA	O-C	PER
OE	-	.776**	-.167*	.226**	.204*	.175*	.331**
PE	.776**	-	-.207**	.247**	.182*	.201*	.249**
CES	.947**	.908**	-.200*	.228**	.209*	.197*	.314**

*p<0.05
**p<.01

PA: Level of physical activity - Lifestyle Questionnaire (Canada Fitness Survey)
O-C: Obsessive-Compulsive subscale of the SCL-90
PER: Self-Oriented Perfectionism subscale of the Multidimentional Perfectionism Scale
RSE: Rosenberg's Self Esteem Scale
BDS: Body Dissatisfaction Subscale of the Eating Disorder Inventory